

DGR 630/2019 - NTC 2018

## Relazione geologico-sismica con analisi di RSL ed approfondimenti di 3 livello

OGGETTO: PUA "Comparto Via Romana"

Loc.: Via San Matteo / Via Romana - Medolla (MO)

Committente: **Esseservizi srl**  
Medolla (MO)

Progettista: **CBL engineering srl**  
Mirandola (MO)

Bibbiano (RE), Luglio 2020

*Dr Geol. Sergio Lasagna*

*Sede amministrativa:*

*Via Carso, 59/1*

*42021 Bibbiano (RE)*

*PI: 02411370352*

*CF: LSGSRG62R21H223N*

*Sede operativa:*

*Via Codisotto a Mane, 2/A*

*42044 Gualtieri (RE)*

*[sergiolasagna@alice.it](mailto:sergiolasagna@alice.it)*



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**ALLEGATO 2: *indagine geofisiche MASW-HS, HVSR, Re.Mi.***

**ALLEGATO 3: *verifiche alla liquefazione***

## 1. PREMESSA

La presente relazione è funzionale al progetto per la lottizzazione di un'area situata tra Via San Matteo e Via Romana a Medolla (Fig. 1).

Nel rispetto della legislazione vigente, in particolare il DGR 630/2019 e le NTC 2018, il presente studio è finalizzato a definire, per il sito in esame, quanto segue:

- caratteristiche geologiche, geomorfologiche ed idrogeologiche;
- caratteristiche geotecniche;
- caratteristiche sismiche con analisi di RSL ed approfondimenti di 3 livello riferiti alla possibile occorrenza del fenomeno di liquefazione delle sabbie;

## 2. INDAGINI E STUDI ESEGUITI

Per la caratterizzazione litostratimetrica e geotecnica dei depositi di sottosuolo, sono state eseguite n. 4 prove penetrometriche statiche con punta meccanica (CPT) e n. 1 prova penetrometrica con punta elettrica e piezocono (CPTU), quest'ultima come da indicazioni di DGR 630/2019 per una migliore valutazione del rischio liquefazione dell'area - Allegato 1:

- CPT 1: 30 m di profondità da p. campagna attuale (\*)
- CPT 2: 15 m di profondità da p. campagna attuale (\*)
- CPT 3: 15 m di profondità da p. campagna attuale (\*)
- CPT 4: 15 m di profondità da p. campagna attuale (\*)
- CPTU 1: 20 m di profondità da p. campagna attuale

Per la caratterizzazione sismica del sito, oltre alla prova CPTU, sono state eseguite le seguenti indagini geofisiche - Allegato 2:

- MASW-HS (Multichannel Analysis of Surface Waves) a mezzo sismografo a 24 canali
- HVSR (Horizontal to Vertical Spectral Ratio) a mezzo sismografo a stazione singola (tromografo digitale)
- Re.Mi. (Refraction Microtremor) a mezzo sismografo ABEM (\*)

(\*) indagini eseguite nel 2008 da "GEO GRUP srl" nell'ambito di precedente studio di fattibilità in seguito decaduto per decorrenza dei termini di presentazione.

L'ubicazione delle indagini eseguite è indicata nella planimetria di Fig. 1.

Per la definizione del modello geologico e sismico dell'area di studio le indagini eseguite sono state comparate ed implementate con gli studi pregressi, comprendenti l'area in esame.

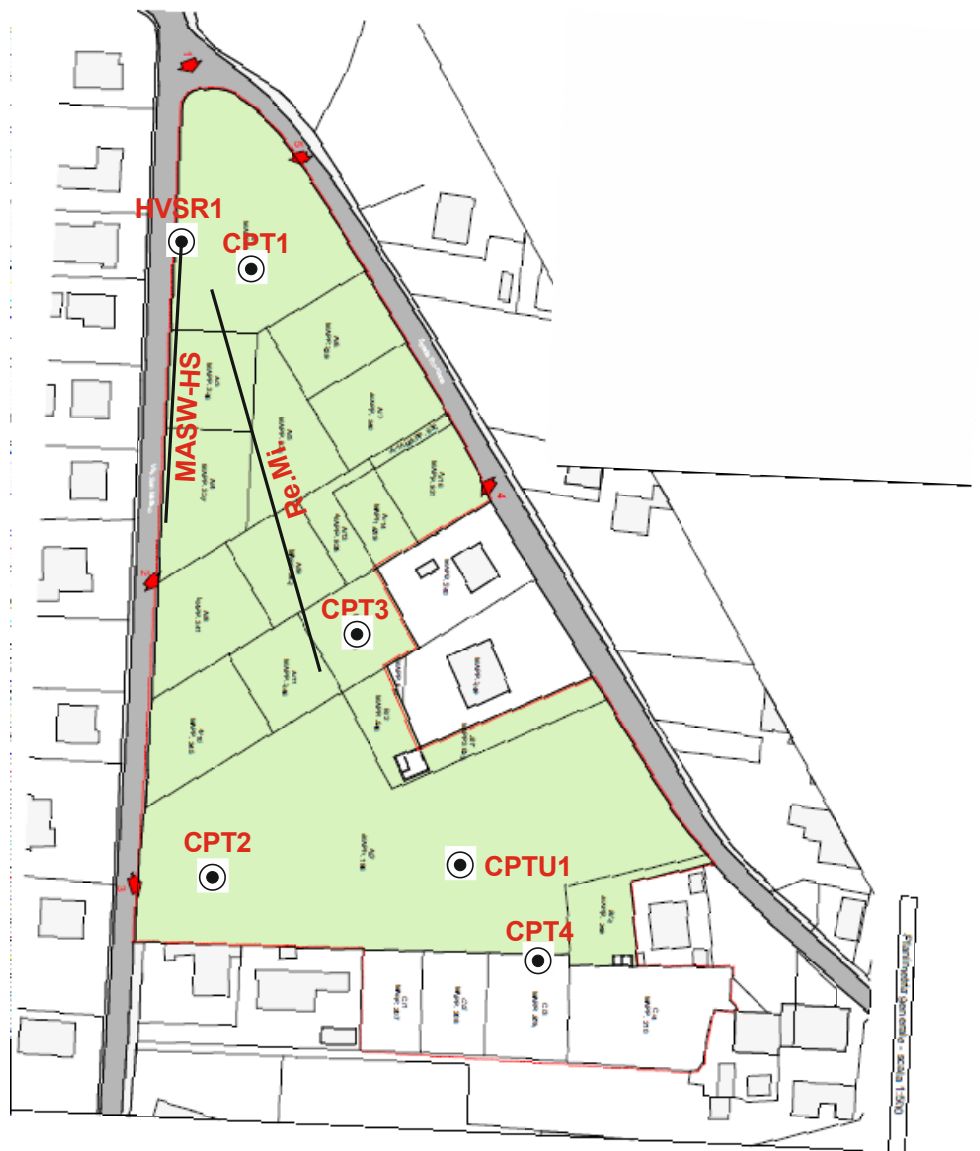


Fig. 1 - Planimetria aerea con ubicazione indagini geognostiche eseguite (prova penetrometrica CPT / CPTU, indagine geofisica MASW-HS, HVSR, Re.Mi.)

### 3. GEOLOGIA

L'area di studio ricade in prossimità della zona assiale del Bacino Sedimentario Padano, vasta depressione delimitata a cintura dai rilievi appenninici ed alpini e colmata da un potente accumulo di depositi marini ed alluvionali di età pliocenica e quaternaria.

Nello specifico i terreni di sottosuolo che potranno influenzare direttamente o indirettamente l'opera in progetto sono rappresentati da sistemi sedimentari di pianura alluvionale ad alimentazione padana (Fiume Po) costituiti da depositi prevalentemente limosi, con possibili intercalazioni lenticolari di sabbie fini/sabbie limose e argille organiche. Il primo orizzonte sabbioso significativamente potente ed esteso lateralmente si rinviene nell'area in esame a profondità di oltre 20 m da piano campagna (Fig. 2).

Il livello piezometrico, alla data di esecuzione delle indagini geognostiche, è stato rinvenuto alla profondità di circa 2.5 m da piano campagna. Sulla base di indagini eseguite in aree limitrofe si può ritenere che il livello di max risalita della falda freatica sotterranea possa raggiungere la profondità di 1.0-1.5 m da piano campagna.

Per quanto concerne l'aspetto geomorfologico l'area appartiene alla bassa pianura alluvionale modenese; topograficamente si trova a circa 20 m.s.l.m.; presenta una morfologia decisamente pianeggiante, classificabile come T1 secondo le NTC/2008.

L'andamento tettonico dell'area in esame, desumibile dalla Carta Sismotettonica dell'Emilia Romagna (Fig. 3), presenta in generale un direttrice principale orientata NO – SE ed una secondaria NE - SW; i lineamenti tettonici riportati dagli Autori non interessano comunque i depositi superficiali sede di intervento. Indagini profonde sia dirette (sondaggi) che indirette, di tipo geofisico, hanno evidenziato la presenza di ampie strutture plicative, con direzione NO – SE e vergenza a NE (rampe frontali) che si raccordano tra loro dando luogo a strutture traspressive a direzione NE – SW (rampe laterali). Tutte queste strutture rappresentano la risposta all'azione dello stress tettonico legato alle fasi orogenetiche dell'Appennino settentrionale.

Le anticlinali sono, a volte accompagnate da faglie inverse e sovrascorrimenti a testimonianza del carattere fortemente compressivo dell'azione tettonica mentre, la presenza di faglie normali con giacitura meridiana, evidenzia una successiva fase distensiva che ha disarticolato le strutture a pieghe.

L'esame della Carta Sismotettonica di Fig. 3 mostra che la struttura attiva sepolta più prossima al Comune di Medolla, peraltro responsabile della sequenza sismogenetica di maggio-giugno 2012, è il thrust principale associato al sistema della Dorsale Ferrarese. Presenta direzione NO - SE passando per i comuni di Massa Finalese, Concordia, Rolo e Fabbrico.

La recente riclassificazione sismica del territorio nazionale (Ordinanza P.C.M. 3274/2003) classifica 105 comuni in zona 2 ( $0,15 < a_g/g < 0,25$ ; dove "a<sub>g</sub>" è l'accelerazione di picco orizzontale al suolo con probabilità di superamento del 10% in 50 anni e "g" è l'accelerazione di gravità), 214 in zona 3 ( $0,05 < a_g/g < 0,15$ ) e i restanti 22 comuni in zona 4 ( $a_g/g < 0,05$ ). Il Comune di Medolla è inserito in **zona sismica 3**.

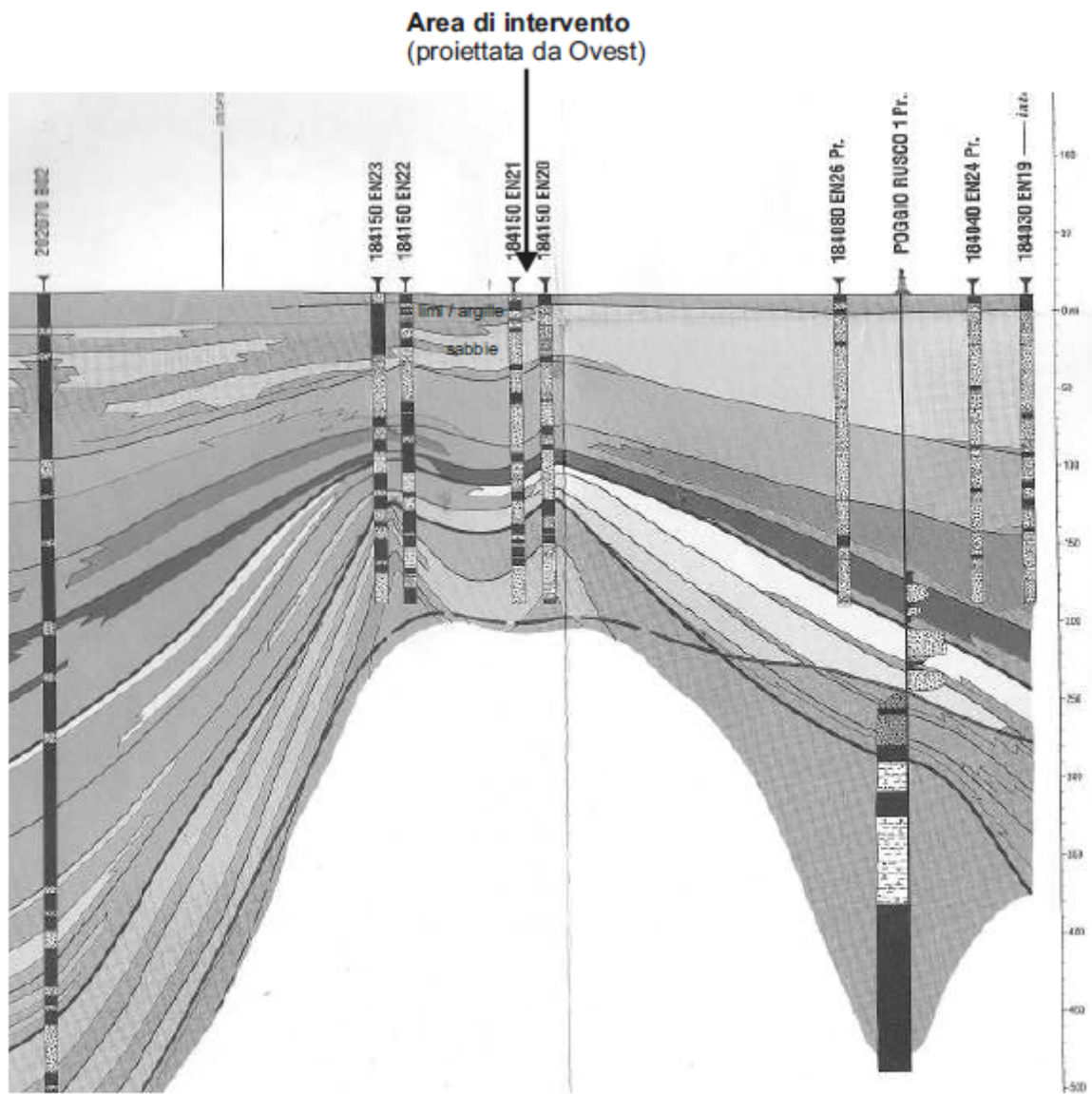


Fig. 2: stralcio sezione idrostratigrafica limitrofa all'area di studio tratta dal volume "Riserve idriche sotterranee della Regione Emilia Romagna - RER, ENI-AGIP, 1988".

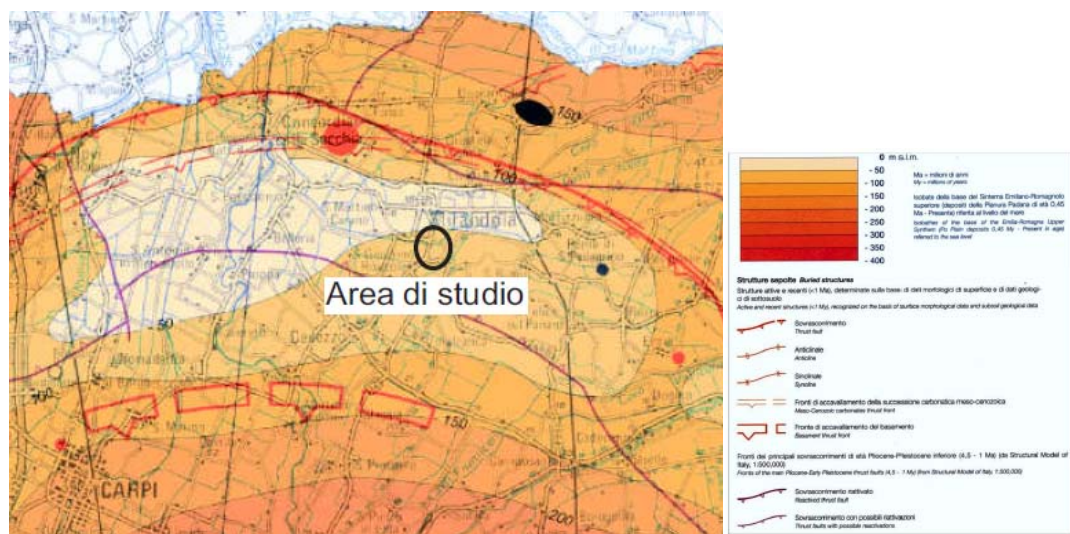


Fig. 3 - Stralcio Carta Sismotettonica della Regione Emilia Romagna

## 4. GEOTECNICA

Per la valutazione dei principali (ai fini edificatori) parametri geotecnici rappresentativi di ciascun strato di terreno, a partire dai dati delle indagini eseguite, sono state adottate le seguenti correlazioni (Allegato 1):

### prove penetrometriche statiche CPT

- Begemann (1965) e Schmertmann (1978) per la classificazione dei terreni in base ai valori della resistenza alla punta ( $q_c$ ) e della resistenza d'attrito laterale locale ( $f_s$ );
- Terzaghi e Peck (1967), Bowles (1982) per la stima del peso dell'unità di volume ( $\gamma$ ) in base ai valori della resistenza alla punta ( $q_c$ ) e alla natura litologica dei terreni;
- Schmertmann (1978), Durgunoglu e Mitchell (1975), Meyerhof (1976) per la stima dell'angolo d'attrito interno ( $\phi'$ ) dei terreni incoerenti;
- Raccomandazioni A.G.I. (1977) per la stima della coesione non drenata ( $C_u$ ) dei terreni coesivi;
- Schmertmann (1970 / 1978), Jamilkowski et al. (1983) per la stima del modulo di deformabilità drenato ( $E'_{25-50}$ );
- Sanglerat (1972), Mitchell e Gardner (1975) per la stima del modulo di deformabilità ( $M_0$ );
- Mayne e Rix (1993) per la stima del modulo di taglio ( $G_0$ ) a basse deformazioni dei terreni coesivi;
- Kimmerling et al. (2002) per la stima del modulo di taglio ( $G_0$ ) a basse deformazioni dei terreni granulari.

### prove penetrometriche statiche CPTU

- Robertson et al. (2012) per la classificazione litologica dei terreni;
- Robertson (2009) per la stima della coesione non drenata ( $C_u$ ) dei terreni coesivi;
- Kulhaway e Mayne (1990) per la stima dell'angolo d'attrito interno ( $\phi'$ ) dei terreni incoerenti;
- Robertson (2009) per la stima del modulo confinato ( $M$ ) dei terreni coesivi;
- Robertson (2009) per la stima del modulo elastico ( $E_s$ ) dei terreni granulari;
- Robertson (2009) per la stima del modulo di taglio ( $G_0$ ) a basse deformazioni.

In Tabella 1e Fig. 4 si riporta in forma sintetica ed in condizioni cautelative una prima parametrizzazione geotecnica dell'area indagata, deducibile, oltre che dalle indagini eseguite, dalla documentazione geologica pregressa disponibile. Si precisa che le valutazioni sotto riportate hanno valore al momento indicativo in quanto basate su un numero di indagini limitato. In fase di progettazione esecutiva dei singoli fabbricati all'interno di ciascun lotto tali indagini andranno implementate in accordo con quanto stabilito da NTC 2018. Relativamente allo Strato 1 si precisa che, in via cautelativa, ai primi 2 metri circa di terreno sovraconsolidati per essiccamento, sono stati attribuiti gli stessi parametri dei terreni sottostanti. Eventuali risalite della falda acquifera potrebbero infatti determinare un decadimento delle caratteristiche geotecniche dei terreni attualmente fuori falda.

Tabella 1: stratigrafia di sintesi e parametri geotecnici rappresentativi (\*) dei terreni indagati

Strato	Litologia prevalente	Y (kN/m <sup>3</sup> )	$\Phi'$ (°)	$C_u$ (kPa)	M (MPa)	Es25 (MPa)	$G_0$ (MPa)
1	limi poco consistenti consistenti	17-18		40-50	3.5-4.5		30-40
2	sabbie limose	17-18	28-30			5-10	60-70
3	limi poco consistenti	17-18		40-50	3.5-4.5		30-40
4	limi mediamente consistenti	18-19		50-70	4.5-5.5		50-60
5	limi poco consistenti	17.5-18.5		45-55	4-5		50-60
6	limi mediamente consistenti	18-19		50-70	4.5-5.5		50-60
7	sabbie limose	18-18.5	29-31			7-12	100-110
8	limi mediamente consistenti	18-19		50-70	4.5-5.5		70-80
9	sabbie limose	18-19	29-31			7-12	100-110
10	sabbie addensate	19-20	>34			>40	>500

(\*) per la stima dei parametri geotecnici caratteristici i valori rappresentativi devono essere rielaborati su base statistica come previsto da NTC 2018

Y: peso di volume;

$\Phi'$ : angolo di attrito efficace;

$C_u$ : coesione non drenata;

M: modulo confinato;

Es25: modulo elastico operativo;

$G_0$ : modulo di taglio a basse deformazioni

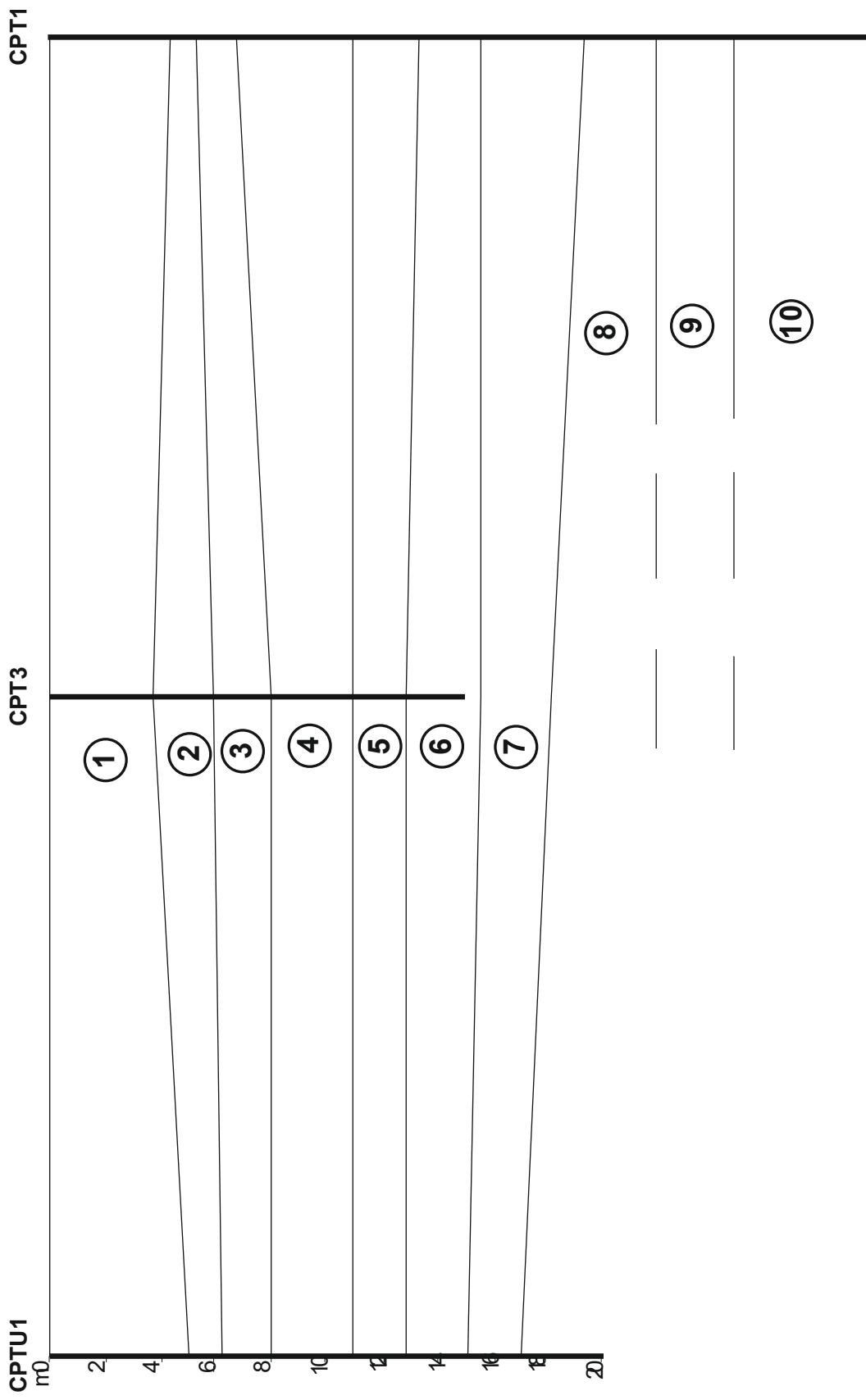


Fig 4: sezione litostratigrafica schematica (descrizione strati in Tabella 1)

## 5. SISMICA

### 5.1 Pericolosità sismica di base

I valori di magnitudo attesa e di accelerazione di riferimento su suolo rigido caratteristici dell'area in esame sono stati scelti come segue:

**Magnitudo:** metodo indicato negli ICMS (Gruppo di Lavoro MS, 2008). Secondo tale metodo, per i siti che cadono in una delle 36 zone sismogenetiche della zonazione sismogenetica nazionale "ZS9" (Meletti e Valensise, 2004), si assume come M attesa il valore  $M_{w_{max}}$  della zona relativa. Nello specifico, per l'area in esame, ricompresa all'interno della Zona 912, si ha:

$$M_{w_{max}} = 6.14$$

**Accelerazione:** la DAL RER 112/2007 "Indirizzi per gli studi di microzonazione sismica in Emilia-Romagna per la pianificazione territoriale ed urbanistica" fornisce i valori di  $a_{g_{ref}}$  (10% di probabilità di superamento in 50 anni su suolo rigido) di ogni comune dell'Emilia-Romagna. Per il Comune di Medolla si ha:

$$a_{g_{ref}} \text{ al bedrock} = 0.150(g)$$

### 5.2 Risposta Sismica locale (RSL)

#### Dati di input per l'analisi di RSL: accelerogrammi

Nel caso in esame, sono stati utilizzati i 3 accelerogrammi spettro compatibili messi a disposizione dal "Servizio geologico, sismico e dei suoli" della Regione Emilia Romagna, relativi al Comune di Medolla (Fig.5):

000046xa\_036021Medolla

000126xa\_036021Medolla

000354xa\_036021Medolla

Gli accelerogrammi sono quindi stati inseriti nel software di elaborazione per il calcolo della "LSR 2D" - *Version 4.5.1 della STACEC* già opportunamente scalati rispetto al valore di  $a_{g_{ref}}$  al bedrock attesa in sito, considerando, come riportato nel paragrafo precedente, un sottosuolo rigido affiorante (Cat. A) e TR 475 anni:

$$a_{g_{ref}} \text{ al bedrock} = 0.150(g)$$

# ACCELEROGRAMMI DI INPUT

DATABASE REXEL  
SCALATI  $ag/g = 0,150$

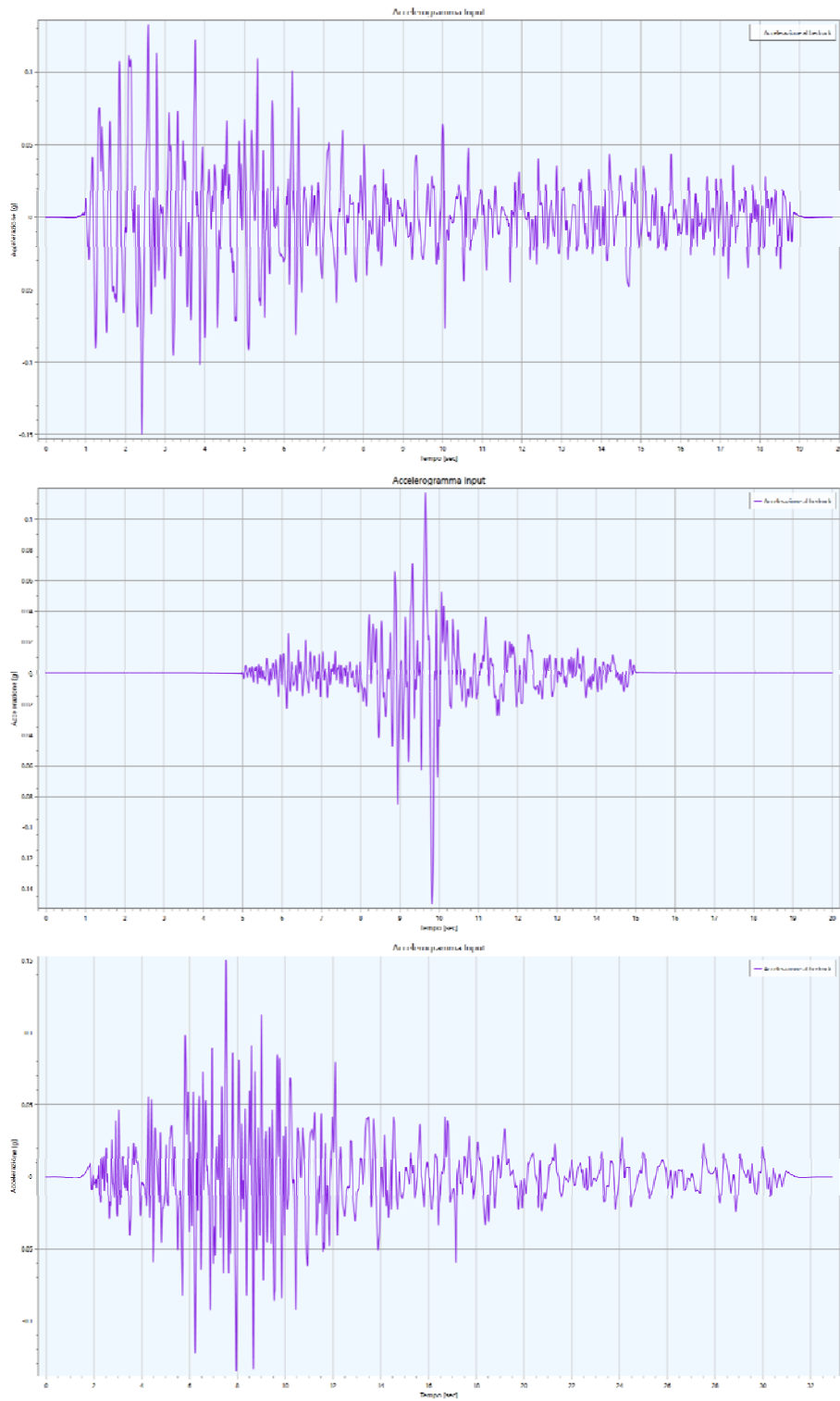
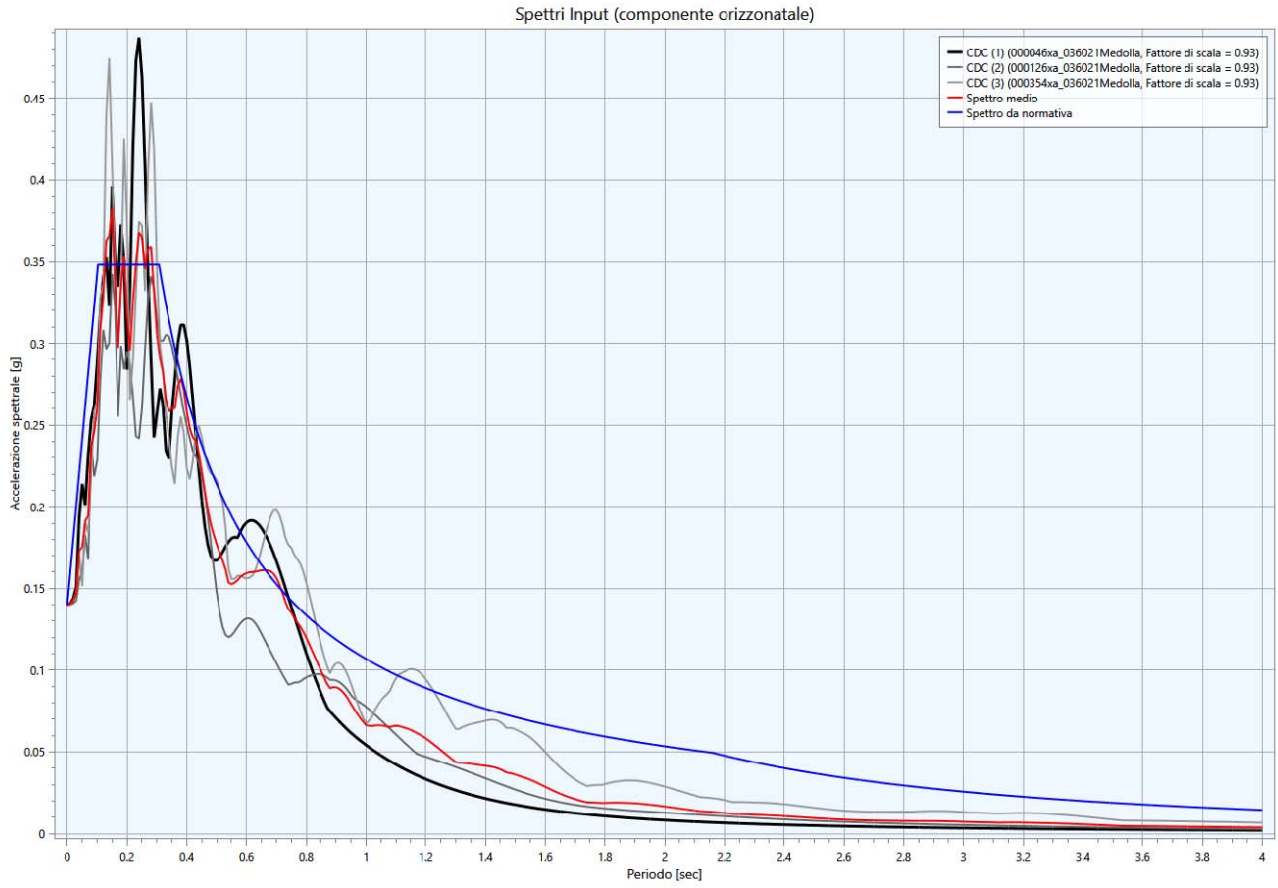


Figura 5 - Serie temporali di input che vengono poi riscalate in funzione della P.G.A.0 attesa al bedrock sismico (sottosuolo di Cat. A).

# SPETTRI DI INPUT



## Dati di input per l'analisi di RSL: modello sismo-stratigrafico

Attraverso le prove geotecniche e sismiche eseguite in sito (vedi allegati) e all'analisi dei dati estrapolati dal database cartografico della Regione Emilia Romagna (<http://geo.regione.emilia-romagna.it/geocatalogo/index.htm>) relativi a pozzi e carotaggi realizzati nell'intorno dell'area d'interesse, si è ottenuto il modello sismo-stratigrafico semplificato riportato in Fig. 6.

Attraverso il software di calcolo "LSR 2D - Versione: 4.5.1", è stata quindi calcolata la risposta dinamica monodimensionale (1D), optando per una analisi equivalente lineare (EQL), basata su un modello di propagazione lineare delle onde in cui le proprietà dinamiche del terreno, quali "Modulo di taglio G" e "Rapporto di smorzamento D", vengono fatti variare in funzione del livello deformativo.

Pertanto, a ciascuno strato definito nel modello sismo-stratigrafico di Fig. 6, è stata associata una coppia di curve che definisce il comportamento non lineare del terreno in funzione di un aumento percentuale della deformazione di taglio:

- la curva di decadimento del Modulo di rigidezza al taglio G alle basse deformazioni espresso come rapporto  $G/G_0$ ;
- la curva di variazione dello smorzamento D.

Creazione guidata modello 1D

**Generale**

Varie

Larghezza base [m] **1.00**

Caratteristiche bedrock

$\rho$	[Kg/m <sup>3</sup> ]	<b>2100.00</b>
Vs	[m/s]	<b>600.00</b>
Vp	[m/s]	<b>1300.00</b>

**Strati**

	Strato	Spessore [m]	$\rho$ [Kg/m <sup>3</sup> ]	Vs [m/s]	Ni	Modello geotecnico	Colore
1	Strato (1)	0.30	1500.00	50.00	0.33	Guastalla - S3_GS_C1 Limi argillo	
2	Strato (2)	0.30	1650.00	120.00	0.16	Guastalla - S3_GS_C1 Limi argillos	
3	Strato (3)	1.20	1730.00	155.00	0.22	Guastalla - S3_GS_C1 Limi argillos	
4	Strato (4)	2.00	1730.00	120.00	0.49	Guastalla - S3_GS_C1 Limi argillos	
5	Strato (5)	2.50	1730.00	165.00	0.15	Guastalla - S3_GS_C1 Limi argillos	
6	Strato (6)	7.20	1730.00	200.00	0.33	Guastalla - S3_GS_C1 Limi argillos	
7	Strato (7)	6.50	1800.00	205.00	0.15	Guastalla - S3_GS_C1 Limi argillos	
8	Strato (8)	13.00	1840.00	275.00	0.15	Seed & Idriss, Sand Mean	
9	Strato (9)	46.00	1940.00	400.00	0.15	Seed & Idriss, Sand Mean	
10	Strato (10)	54.00	2060.00	450.00	0.15	EPRI (93), 250-500 ft	

OK Annulla

Figura 6 - Schermate di Input tratte dal software "LSR 2D", dove viene definito il modello sismo-stratigrafico del sito di interesse.

## Dati di output della RSL

A seguito della modellizzazione numerica e dei grafici di output ottenuti dalla simulazione in LSR 2D, possono essere ricavate diverse informazioni, che permettono di descrivere in maniera dettagliata il comportamento sismico della colonna stratigrafica soprastante il bedrock di riferimento.

I parametri di output vengono di seguito elencati:

- Arias Intensity Profile → Intensità di Arias;
- Damping Ratio → Rapporto di Smorzamento;
- Dissipated Energy Profile → Profilo di energia dissipata;
- Final Shear-Wave Velocity Profile → Velocità finale delle onde di taglio;
- Initial Shear-Wave Velocity Profile → Velocità iniziale delle onde di taglio;
- P.G.A → Peak Ground Acceleration Profile;
- P.G.D. → Peak Ground Displacement Profile;
- Maximum Error Profile → Massimo errore;
- Maximum Shear-Strain Profile → Massima deformazione di taglio;
- Maximum Shear-Stress Profile → Massimo modulo di taglio
- Peak Ground Velocity Profile → Massima Velocità per ogni profondità;
- Shear-Modulus Profile → Modulo di taglio;
- Stress Ratio Profile → Rapporto fra Massimo sforzo di taglio e Massimo sforzo efficace;
- Stress Reduction Coefficient ( $r_d$ ) Profile → Coefficiente di riduzione dello sforzo di taglio  $r_d$
- Vertical Total Stress Profile → Pressione vertical totale;
- Vertical Effective Stress Profile → Pressione verticale efficace;
- Time Series → le serie temporali in accelerazione, spostamento, velocità, deformazione di taglio e sforzo di taglio alle profondità desiderate;
- Acceleration Response Spectrum → Gli spettri di risposta in accelerazione;
- Fourier Amplitude Spectrum → Lo spettro di Fourier in ampiezza;
- Acceleration Transfer Function → La funzione di trasferimento dell'accelerazione → Rapporto degli spettri di Fourier delle accelerazioni;
- Spectral Ratio → Il Rapporto Spettrale (rapporto fra spettri di risposta);
- Strain Transfer Function → La funzione di trasferimento delle deformazioni ovvero il Rapporto fra spettro di Fourier delle deformazioni e spettro di Fourier delle accelerazioni;

Verranno prese in considerazione soltanto alcune delle informazioni ricavate dallo studio di RSL, in particolare quelle che possono avere una ricaduta più sostanziale ai fini progettuali dell'opera.

### 1) P.G.A. Profile - Peak Ground Acceleration Profile

Definisce la massima accelerazione per ogni profondità, in unità di gravità. Consente di valutare l'entità dell'amplificazione locale, intesa come rapporto fra il valore della PGA in superficie e il valore della PGA0 ( $a_{g,ref}$ ) al bedrock (sottosuolo di categoria A) (Fig. 7).

Gli esiti mostrano le variazioni fra le risposte del modello di sottosuolo in relazione ai diversi input sismici assegnati: il rapporto PGA/PGA0 più cautelativo al suolo (cioè il più elevato) è ricavato dall'input:

- 000126xa\_036021Medolla  $FA_{max} = 1,86$

mentre il valore F.A. medio definito su n.3 accelerogrammi è:

**$FA_{medio} 1,58$**

INPUT SISMICO	PGA0 bedrock	PGA Superficie	F.A.
000046xa_036021Medolla	0,150	0,200	1,33
000126xa_036021Medolla	0,150	0,279	1,86
000354xa_036021Medolla	0,150	0,234	1,56
<b>Media</b>	<b>0,150</b>	<b>0,237</b>	<b>1,58</b>

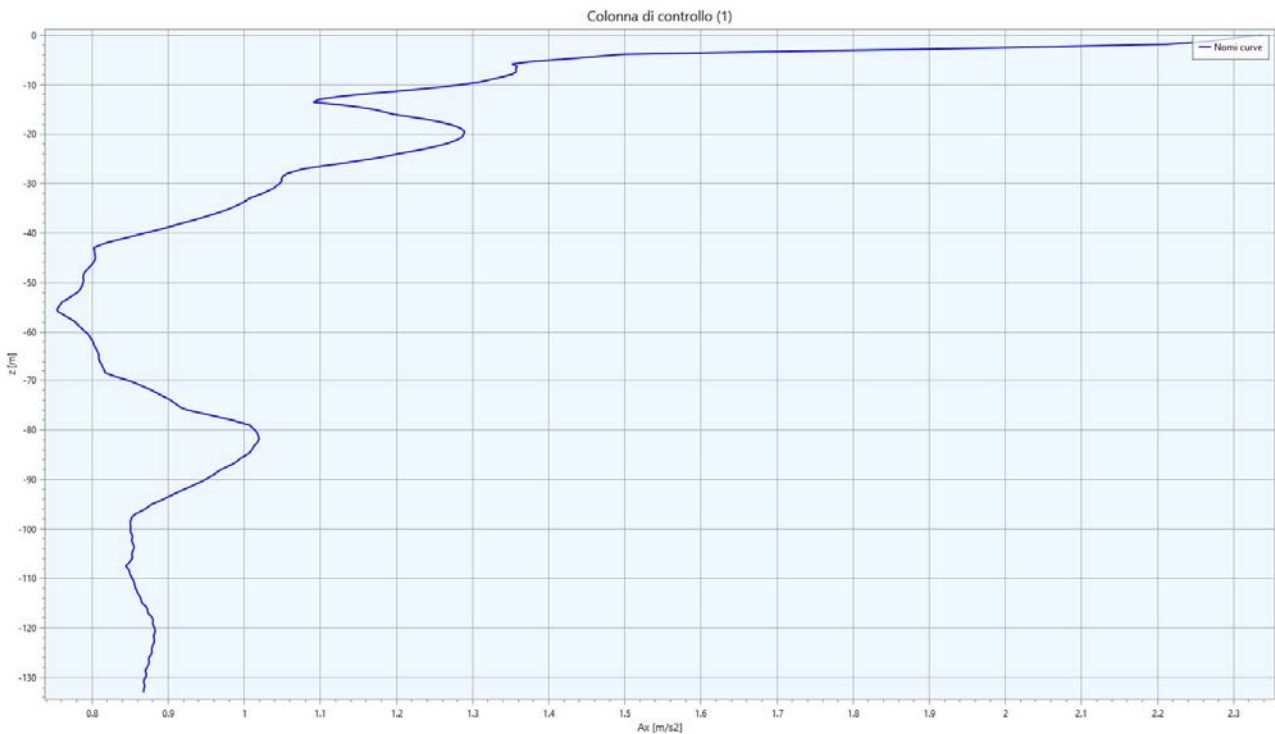


Figura 7 - P.G.A. Profile: si può notare un incremento rilevante della PGA in corrispondenza degli orizzonti più superficiali (da 13,5m di profondità fino a p.c.).

## 2) Housner Intensity - Intensità di Housner

L'intensità di Housner (o intensità dello spettro di risposta) viene definita come segue:

$$SI = \int_{T_1}^{T_2} PSV(T_0, \xi) dT_0$$

dove PSV è lo spettro di risposta di pseudo-velocità,  $T$  e  $\xi$  sono rispettivamente il **periodo** e lo **smorzamento strutturale**.

Questo parametro di severità del moto sismico è correlato al danno potenziale atteso per effetto del terremoto in esame, dal momento che la maggior parte delle strutture hanno un periodo fondamentale di vibrazione nell'intervallo compreso tra 0.1 e 1.5 secondi. Dimensionalmente l'intensità di Housner è uno spostamento (cm).

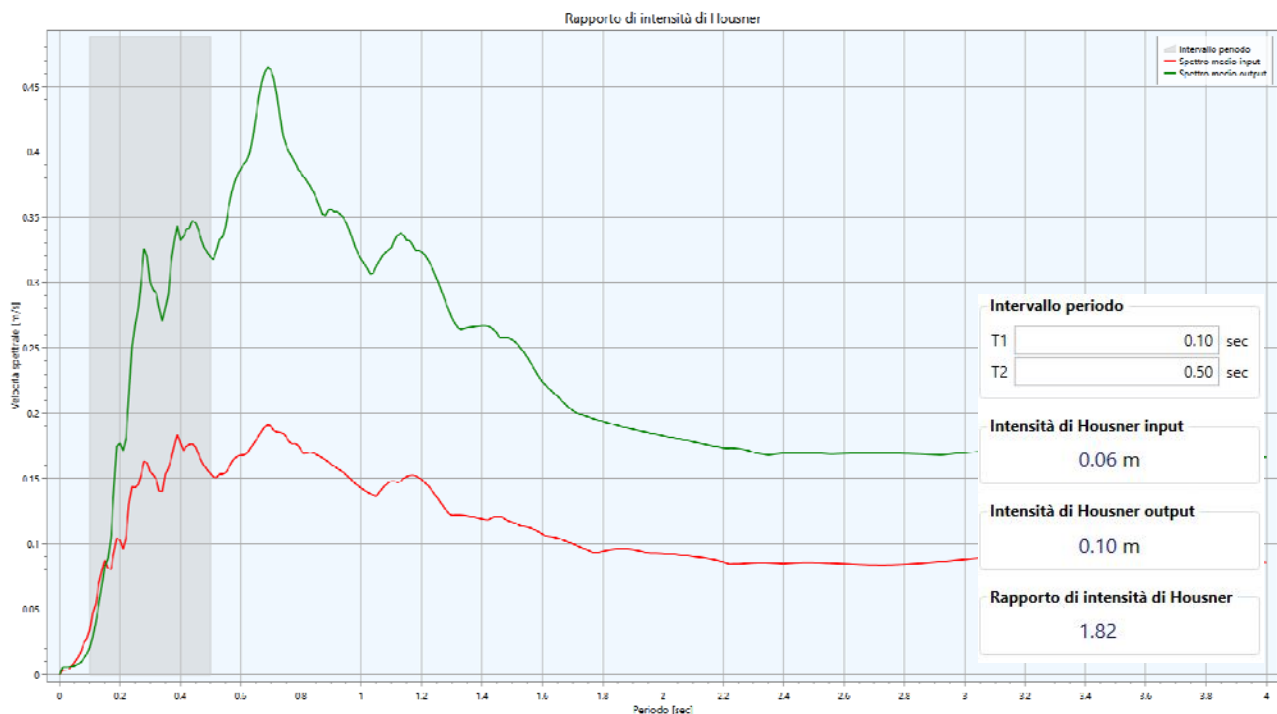


Figura 8a - Intensità di Housner fra gli intervalli  $0,1 < SI < 0,5$ .

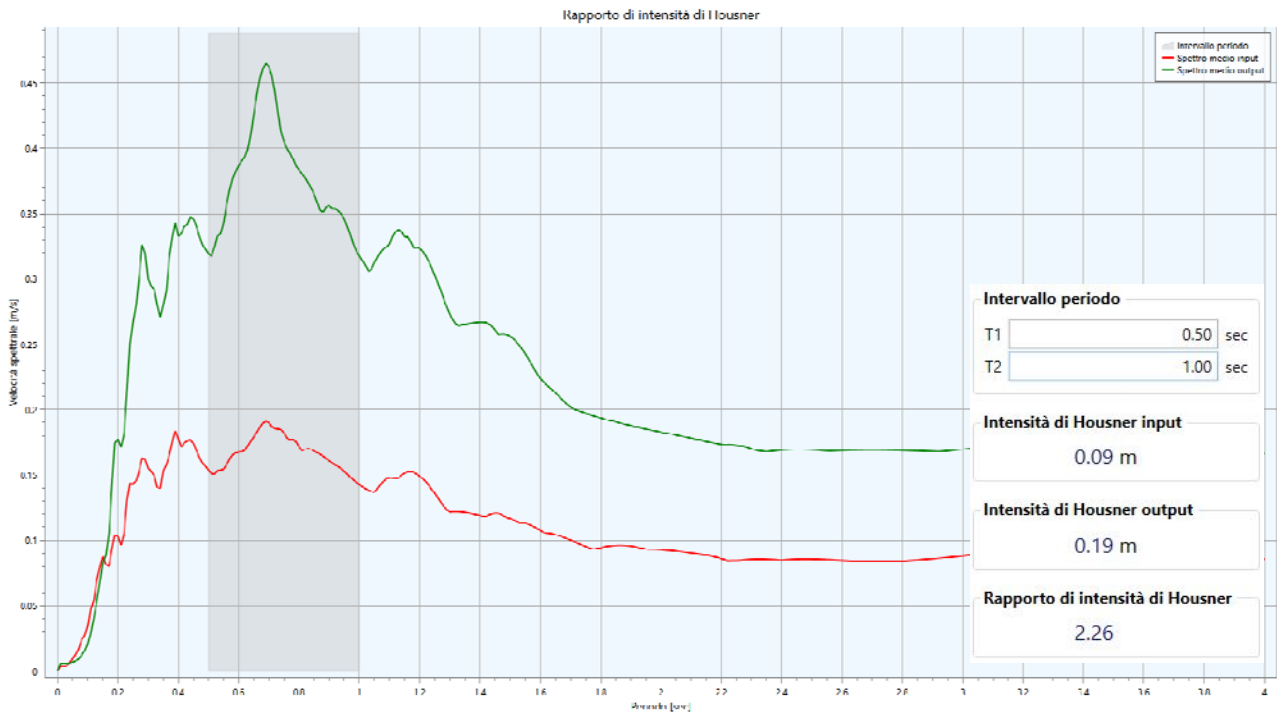


Figura 8b - Intensità di Housner fra gli intervalli  $0,5 < SI < 1,0$ .

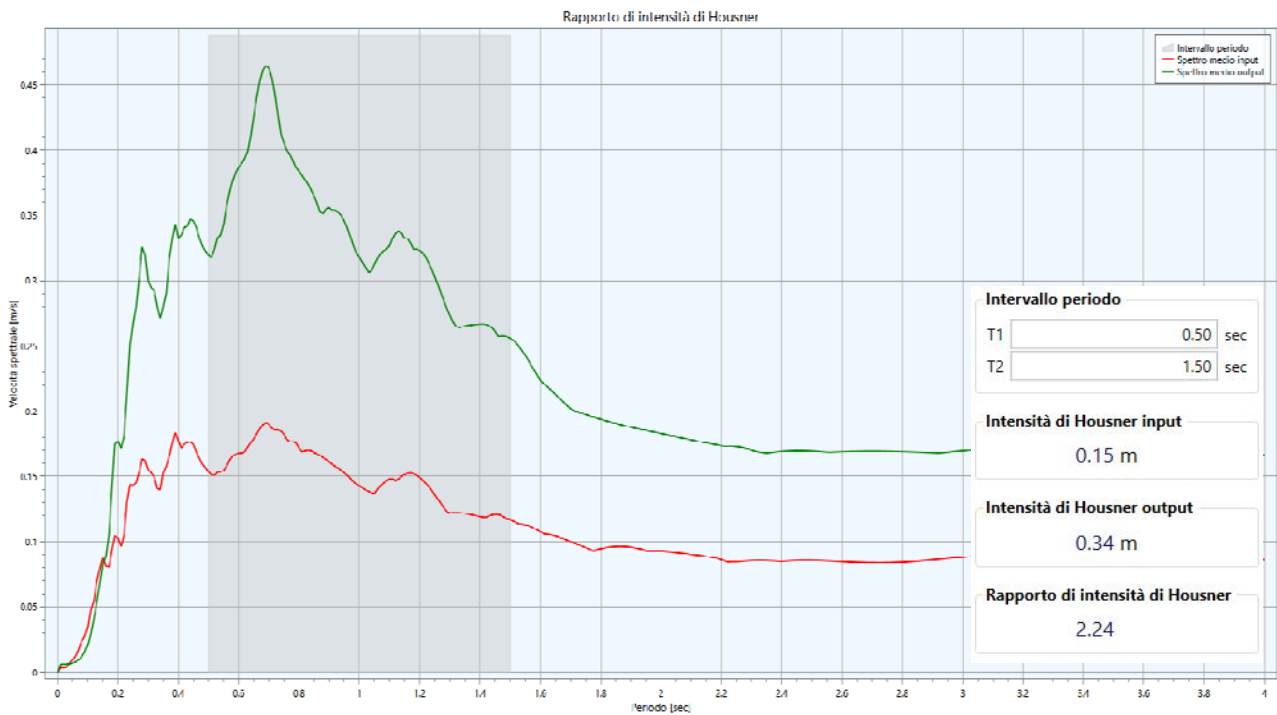


Figura 8c - Intensità di Housner fra gli intervalli  $0,5 < SI < 1,5$ .

### 3) Acceleration Response Spectrum - Spettri di risposta in accelerazione

Rappresenta l'elaborato fondamentale richiesto dagli strutturisti e in "LSR 2D" può essere calcolato sia in superficie che per una profondità di interesse.

Nel caso in esame (Fig. 9) è stato calcolato per gli SLV a piano campagna, con un coefficiente di smorzamento viscoso equivalente del 5%.

Sulla base delle indagini geofisiche effettuate, il sito presentava un valore di **Vs30** di **197 m/s**, ed è stato classificato in "**Categoria C**". Osservando in dettaglio il grafico (Fig. 9) si può notare come il valore dello spettro medio si vada a collocare al di sopra di quello semplificato di categoria C per periodi  $T < 0,4$  mentre si colloca a valori inferiori per  $0,4 < T < 4,0$ . Lo spettro medio è stato poi adattato alla tipica forma spettrale semplificata, utilizzando come riferimento i valori della "media".

Resta compito dello strutturista definire il valore del periodo proprio e dello smorzamento della struttura, andando a modificare lo "spettro di progetto" in funzione del "Fattore di struttura  $q$ ".

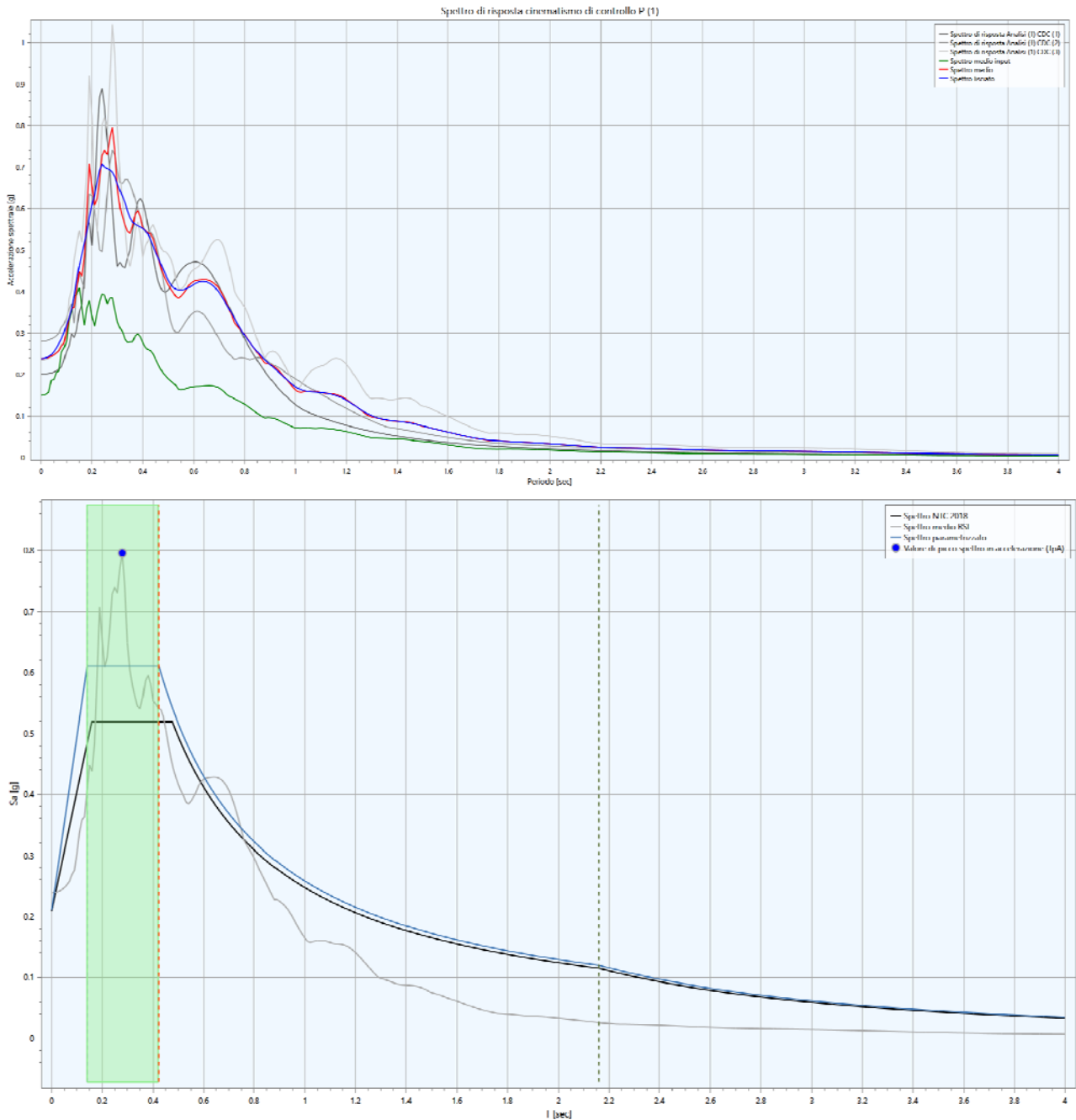


Figura 9 - Spettri di risposta elastica in superficie, calcolati per SLV con smorzamento del 5%.

## Sintesi delle risultanze dell'analisi di RSL

I fattori di amplificazione richiesti da DGR 630/2019 per gli studi di pianificazione territoriale sono, per l'area in esame, riportati in via sintetica nella tabella sottostante:

Tabella 2

<b>FATTORE DI AMPLIFICAZIONE CONSIDERATO</b>	<b>VALORE RICAIVATO DA ANALISI DI R.S.L.</b>
<b>F.A. PGA</b>	<b>1,58</b>
<b>F.A. SA1</b> ( $0.1s < T_0 < 0.5s$ )	<b>1,79</b>
<b>F.A. SA2</b> ( $0.4s < T_0 < 0.8s$ )	<b>2,31</b>
<b>F.A. SA3</b> ( $0.7s < T_0 < 1.1s$ )	<b>2,34</b>
<b>F.A. SA4</b> ( $0.5s < T_0 < 1.5s$ )	<b>2,32</b>
<b>F.A. SI1</b> ( $0.1s < T_0 < 0.5s$ )	<b>1,81</b>
<b>F.A. SI2</b> ( $0.5s < T_0 < 1.0s$ )	<b>2,16</b>
<b>F.A. SI3</b> ( $0.5s < T_0 < 1.5s$ )	<b>2,24</b>

Si considerano trascurabili gli effetti legati all'amplificazione topografica, pertanto l'entità dell'amplificazione sismica è imputabile ai soli fattori stratigrafici.

### 5.3 Suscettività alla liquefazione

Nel sito in esame non sono state censite alterazioni del terreno e/o fuoriuscite di detriti riconducibili a fenomeni di liquefazione occorsi in occasione degli eventi sismici di maggio-giugno 2012.

Come consigliato da DGR 630/219 per il calcolo degli indici del potenziale di liquefazione è stato adottato il metodo di Boulanger e Idriss, 2014 (software GEOLOGISMIKI per la prova CPTU1 e software GEOSTRU per le prove CPT1 e CPT3)

In riferimento a tale metodo, permangono tuttavia alcune perplessità relative ad una sua probabile sovrastima del rischio liquefazione, come riportato anche in alcuni studi di MS comunale, in quanto sovente sono stati ricavati valori di IL elevati anche in aree interessate dal sisma del 2012 ma nelle quali non sono in realtà documentati effetti ascrivibili a fenomeni di liquefazione dei terreni. Per tali ragioni, nel presente studio, si è deciso di effettuare la verifica alla liquefazione utilizzando anche il metodo di Robertson, 2009 (software GEOLOGISMIKI per la prova CPTU1 e software GEOSTRU per le prove CPT1 e CPT3).

I dati di input utilizzati per il calcolo degli indici di liquefazione con entrambi i metodi sono (Par. 5.1, 5.2):

$$Mw_{max} = 6.14$$

$$ag_{max} (PGA) = ag_{ref} * FA = 0.15 * 1.58 = 0.237$$

In Tabella 3 e nei grafici seguenti Figg. 10, 11, 12, 13, 14, 15 sono riportate in forma schematica le risultanze delle verifiche eseguite.

I relativi elaborati di calcolo sono riportati in Allegato 3.

Tabella 3

Verifica liquefazione	LPI	Rischio liquefazione (Sonmez, 2003)
CPTU1 - Boulanger, 2014	3.29	Basso
CPTU1 - Robertson, 2009	0.10	Basso
CPT1 – Boulanger, 2014	0.30	Basso
CPT1 – Robertson, 2009	0.00	Molto Basso
CPT3 – Boulanger, 2014	2.52	Basso
CPT3 – Robertson, 2009	0.81	Basso

I cedimenti post-sismici teorici attesi, con riferimento alla prova CPTU1, risultano pari a circa 3 cm secondo Boulanger e a circa 1 cm secondo Robertson (Fig. 10, 11).

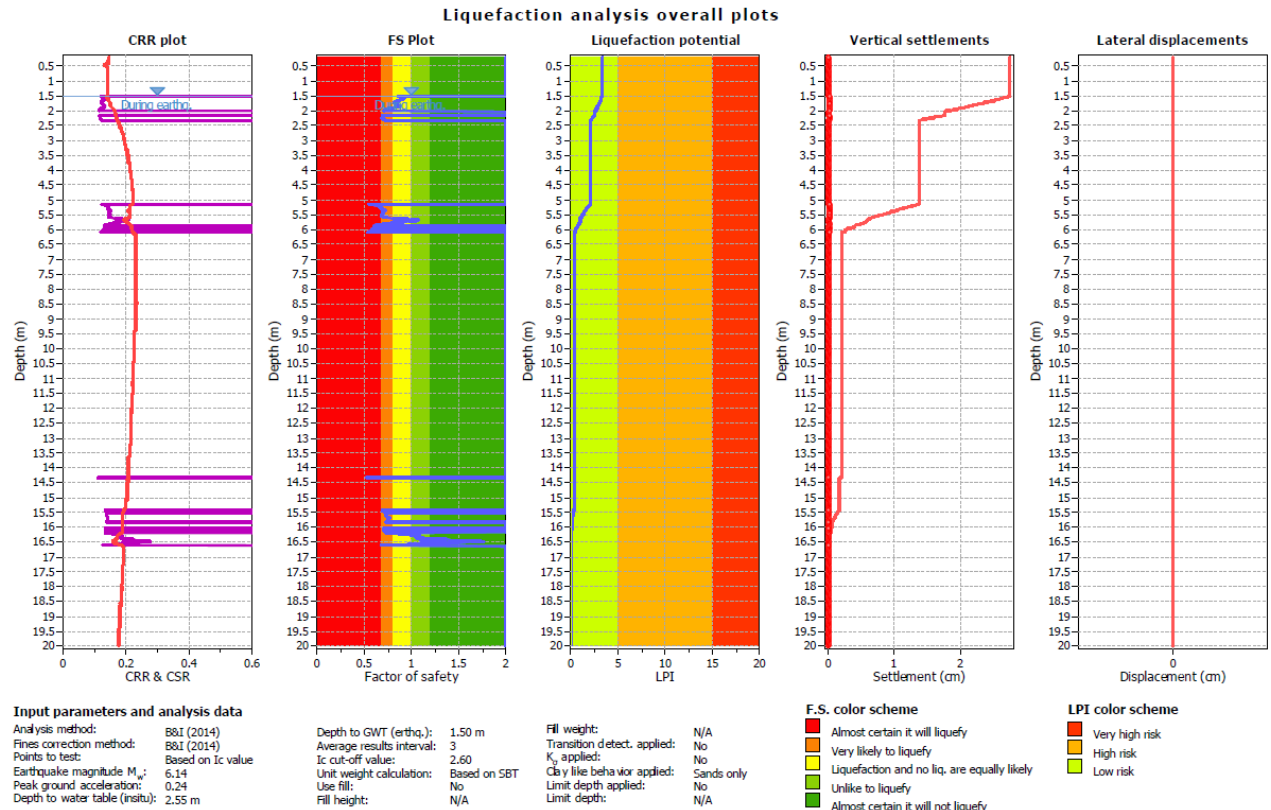
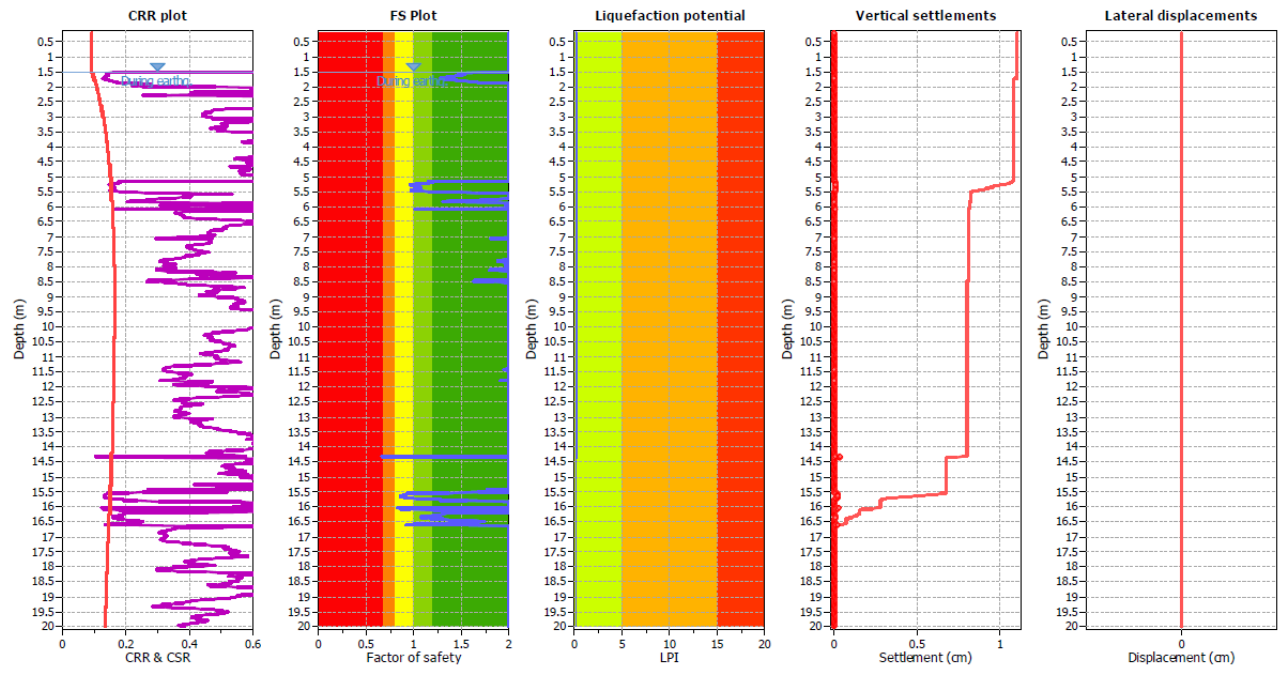


Fig. 10 – Verifica liquefazione (CPTU1 - Boulanger e Idriss, 2014)

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (earthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	$K_s$ applied:	Yes
Earthquake magnitude $M_w$ :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

<b>F.S. color scheme</b>	<b>LPI color scheme</b>
<span style="color: red;">■</span> Almost certain it will liquefy	<span style="color: red;">■</span> Very high risk
<span style="color: orange;">■</span> Very likely to liquefy	<span style="color: orange;">■</span> High risk
<span style="color: yellow;">■</span> Liquefaction and no liq. are equally likely	<span style="color: yellow;">■</span> Low risk
<span style="color: lightgreen;">■</span> Unlike to liquefy	
<span style="color: green;">■</span> Almost certain it will not liquefy	

Fig. 11 – Verifica liquefazione (CPTU1 - Robertson, 2009)

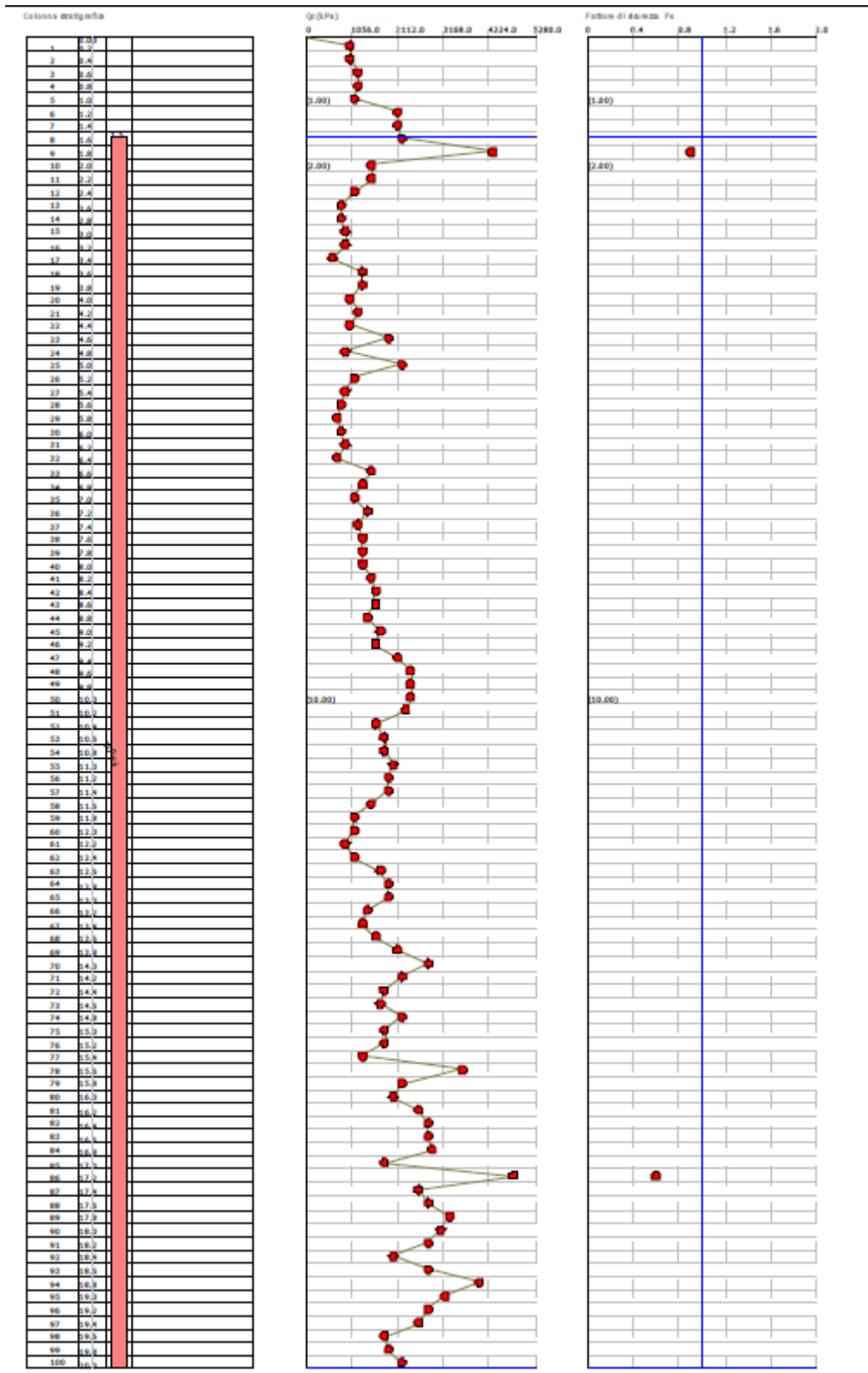


Fig. 12 – Verifica liquefazione (CPT1 - Boulanger e Idriss, 2014)

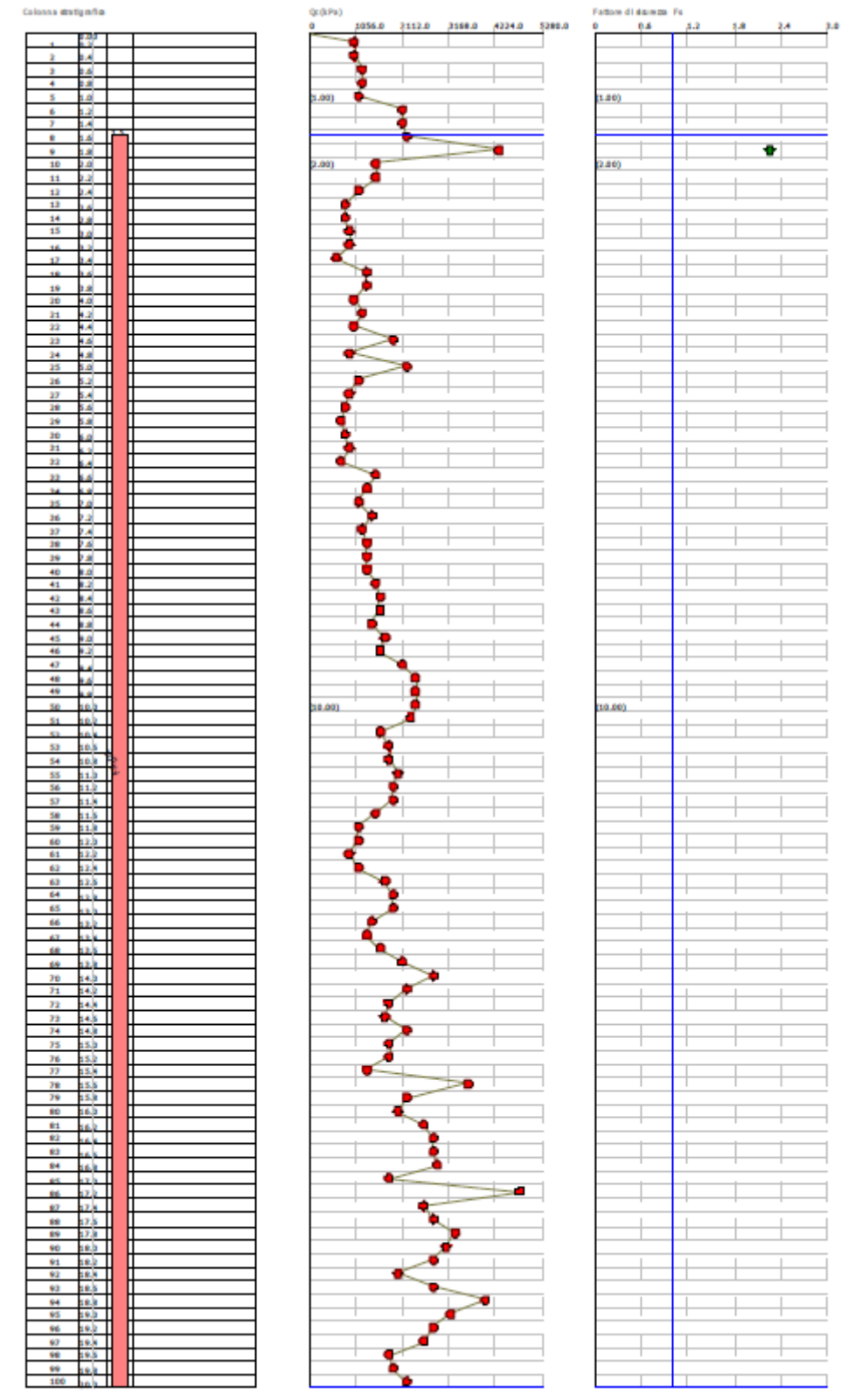


Fig. 13 – Verifica liquefazione (CPT1 - Robertson, 2009)

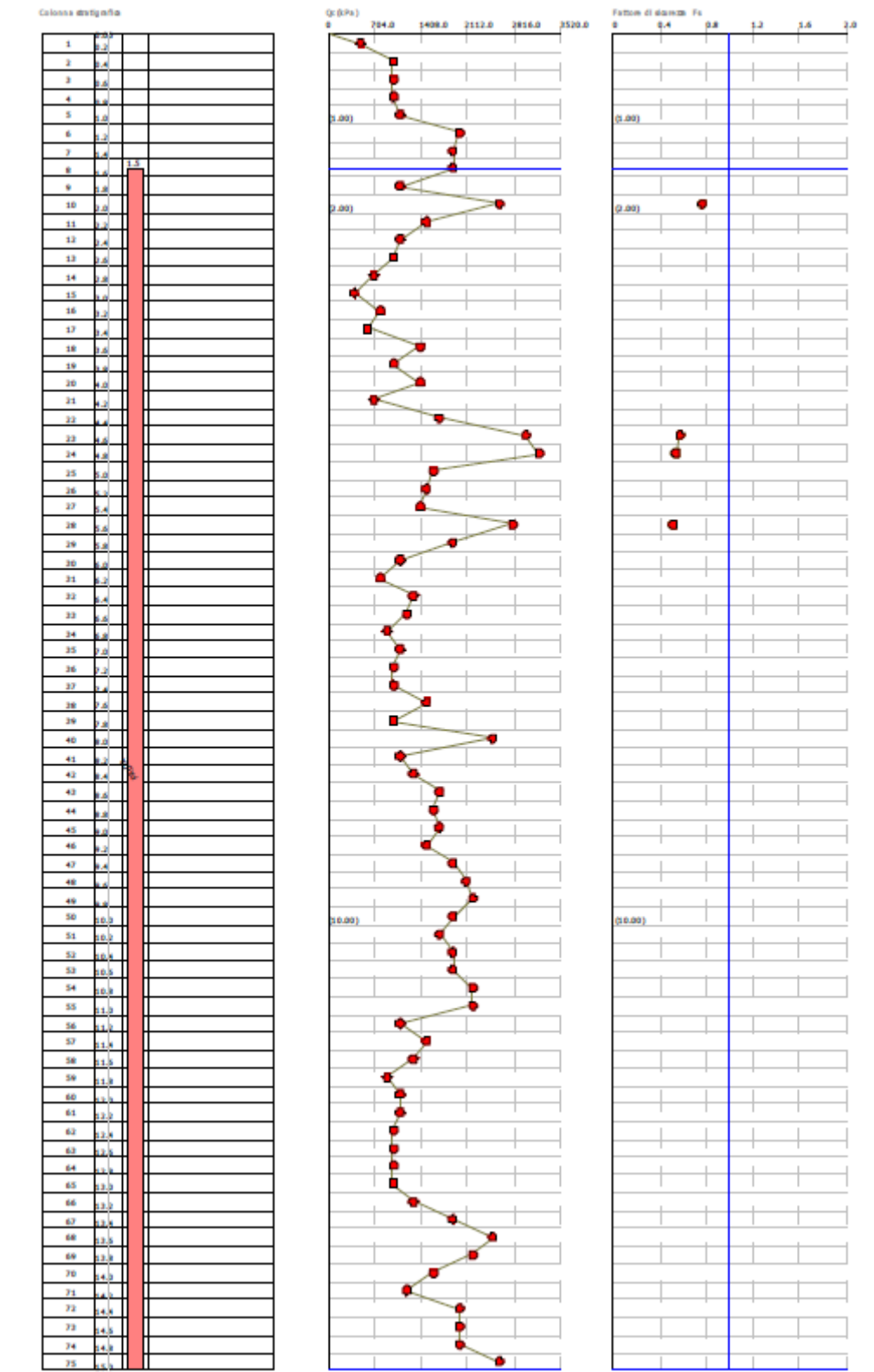


Fig. 14 – Verifica liquefazione (CPT3 - Boulanger e Idriss, 2014)

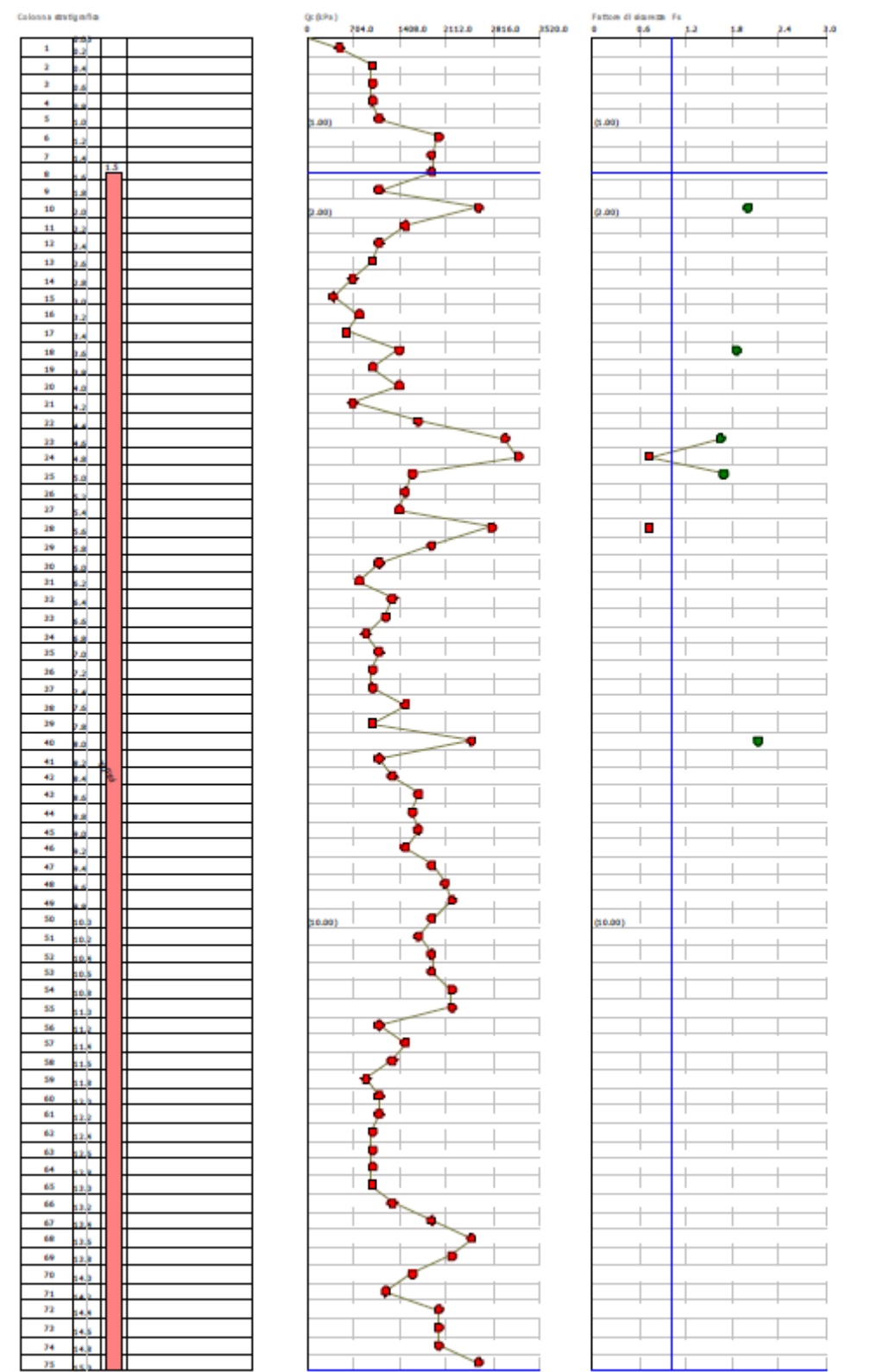


Fig. 15 – Verifica liquefazione (CPT3 - Robertson, 2009)

## 6. RISCHIO IDRAULICO

### Quadro normativo di riferimento

Nel **PGRA** (Piano Gestione Rischio Alluvioni, approvato con Del. n. 2 del 03/03/16) il territorio del Bacino del Fiume Po viene suddiviso in 5 ambiti territoriali ciascuno dei quali di competenza degli enti proprietari e gestori di tali reticoli:

AMBITO TERRITORIALE	SOGGETTO ATTUATORE	Lunghezza del reticolo (Km)
Reticolo idrografico principale ( <b>RP</b> )	Autorità di bacino del fiume Po	6.753
Reticolo secondario collinare e montano ( <b>RSCM</b> )	Regioni	32.313
Reticolo secondario di pianura ( <b>RSP</b> )	Regioni con il supporto di URBIM e dei Consorzi di bonifica	16.745
Aree costiere lacuali ( <b>ACL</b> )	Regioni con il supporto di ARPA e dei Consorzi di regolazione dei laghi	900
Aree costiere marine ( <b>ACM</b> )	Regioni	130

Per ciascun ambito territoriale vengono prodotte le relative mappe di pericolosità nelle quali è raffigurata l'estensione potenziale delle inondazioni causate dai corsi d'acqua (naturali ed artificiali) con riferimento a 3 scenari di accadimento dell'evento alluvionale:

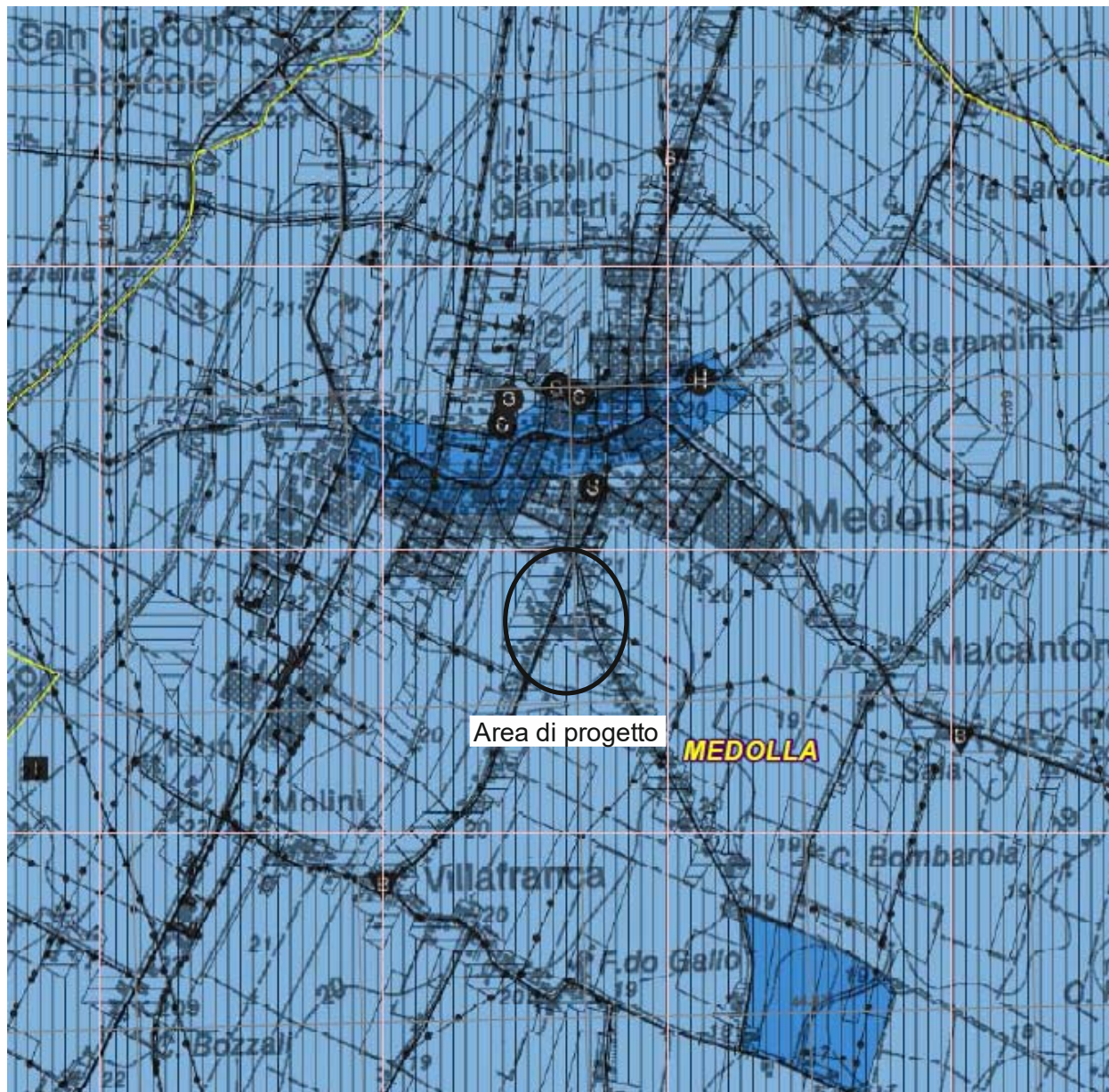
Direttiva Alluvioni		Pericolosità
Scenario	Tempo di ritorno	
Aree allagabili – scenario frequente Elevata probabilità di alluvioni (H = high)	20-50 anni (frequente)	<b>P3</b> elevata
Aree allagabili – scenario poco frequente Media probabilità di alluvioni (M = medium)	100-200 anni (poco frequente)	<b>P2</b> media
Aree allagabili – scenario raro Scarsa probabilità di alluvioni o scenari di eventi estremi (L = low)	500 anni o massimo storico registrato	<b>P1</b> bassa

Nel **DGR 1300/2016** (Disposizioni regionali inerenti l'attuazione del PGRA nel territorio regionale del distretto padano, approvato il 01/08/16) vengono dettate, per ciascuna delle diverse aree di pericolosità (P1, P2, P3) individuate nel PGRA, le relative misure di riferimento per la riduzione del rischio idraulico.

### Rischio idraulico delle aree in progetto

Lo scenario di alluvione ipotizzato per l'area di progetto relativamente al reticolo principale (F. Secchia) è quello raro (P1) con scarsa probabilità di alluvioni.

Lo scenario di alluvione ipotizzato per l'area di progetto relativamente al reticolo dei corsi d'acqua secondari di pianura gestiti dai Consorzi di bonifica e irrigui nella medio - bassa pianura padana è quello poco frequente (P2) con tempi di ritorno tra 100 e 200 anni:



Il DGR 1300/2016 (Cap. 5.2) stabilisce le successive indicazioni operative che devono essere considerate per il rilascio dei titoli edilizi relativi ai seguenti interventi edilizi definiti ai sensi delle vigenti leggi:

- ristrutturazione edilizia;
- interventi di nuova costruzione;
- mutamento di destinazione d'uso con opere.

Nell'ambito dei procedimenti inerenti richiesta/rilascio di permesso di costruire e/o segnalazione certificata di inizio attività, si riportano di seguito, a titolo di esempio e senza pretesa di esaustività, alcuni dei possibili accorgimenti che devono essere utilizzati per la mitigazione del rischio e che devono essere assunti in sede di progettazione al fine di garantire la compatibilità degli interventi con le condizioni di pericolosità di cui al quadro conoscitivo specifico di riferimento, demandando alle Amministrazioni Comunali la verifica del rispetto delle presenti indicazioni in sede di rilascio del titolo edilizio.

### Misure per ridurre il danneggiamento dei beni e delle strutture:

- 1) la quota minima del primo piano utile degli edifici deve essere all'altezza sufficiente a ridurre la vulnerabilità del bene esposto ed adeguata al livello di pericolosità ed esposizione;
- 2) è da evitare la realizzazione di piani interrati o seminterrati, non dotati di sistemi di autoprotezione, quali ad esempio:
  - le pareti perimetrali e il solaio di base siano realizzati a tenuta d'acqua;
  - vengano previste scale/rampe interne di collegamento tra il piano dell'edificio potenzialmente allagabile e gli altri piani;
  - gli impianti elettrici siano realizzati con accorgimenti tali da assicurare la continuità del funzionamento dell'impianto anche in caso di allagamento;
  - le aperture siano a tenuta stagna e/o provviste di protezioni idonee;
  - le rampe di accesso siano provviste di particolari accorgimenti tecnico-costruttivi (dossi, sistemi di paratie, etc);
  - siano previsti sistemi di sollevamento delle acque da ubicarsi in condizioni di sicurezza idraulica.

Si precisa che in tali locali sono consentiti unicamente usi accessori alla funzione principale.

- 3) favorire il deflusso/assorbimento delle acque di esondazione, evitando interventi che ne comportino l'accumulo ovvero che comportino l'aggravio delle condizioni di pericolosità/rischio per le aree circostanti.

La documentazione tecnica di supporto alla procedura abilitativa deve comprendere una valutazione che consenta di definire gli accorgimenti da assumere per rendere l'intervento compatibile con le criticità idrauliche rilevate, in base al tipo di pericolosità e al livello di esposizione.

## **7. CONCLUSIONI**

Sulla base di tutte le indagini e studi eseguiti si ritiene che l'area sia idonea, sotto il profilo geologico, agli interventi edificatori in progetto.

Per quanto riguarda la caratterizzazione geotecnica dei terreni si precisa che le valutazioni riportate nella presente relazione (Tabella 1 e Fig. 4 di Cap. 4) hanno valore al momento indicativo in quanto basate su un numero di indagini limitato. In fase di progettazione esecutiva dei singoli fabbricati all'interno di ciascun lotto tali indagini andranno implementate in accordo con quanto stabilito da NTC 2018.

I valori di FA risultanti dall'analisi di RSL sono riportati in Tabella 2 di Cap. 5 e dovranno essere presi a riferimento in fase progettuale.

Per quanto riguarda i possibili effetti di sito attesi in occasione di terremoto si ritiene di poter escludere il fenomeno della liquefazione, dato che le analisi eseguite in tal senso hanno fornito valori di rischio da Molto Basso a Basso (Tabella 3 di Cap. 5).

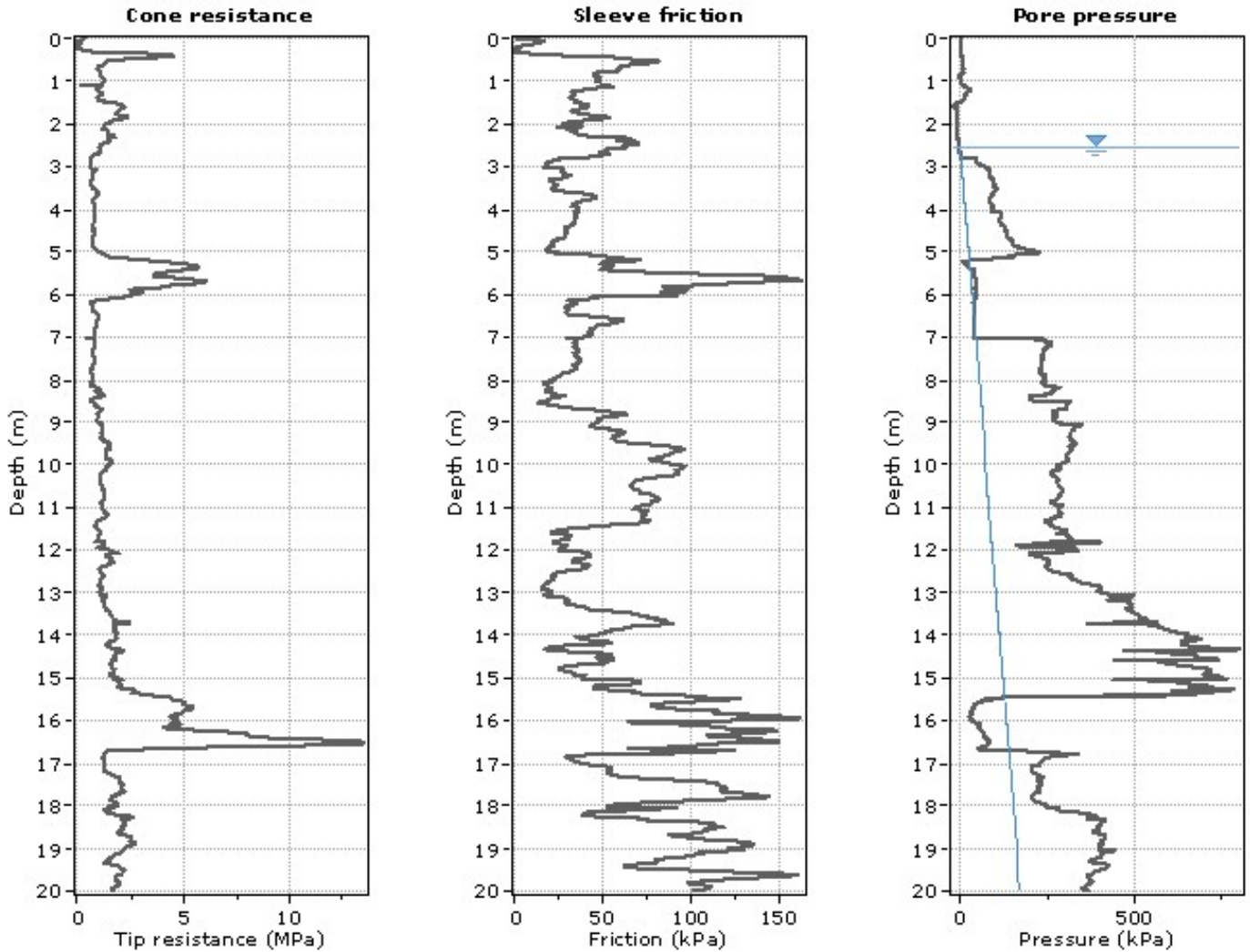
Per quanto riguarda il rischio idraulico si raccomanda di ottemperare alle indicazioni elencate in Cap. 6.

# ALLEGATO 1

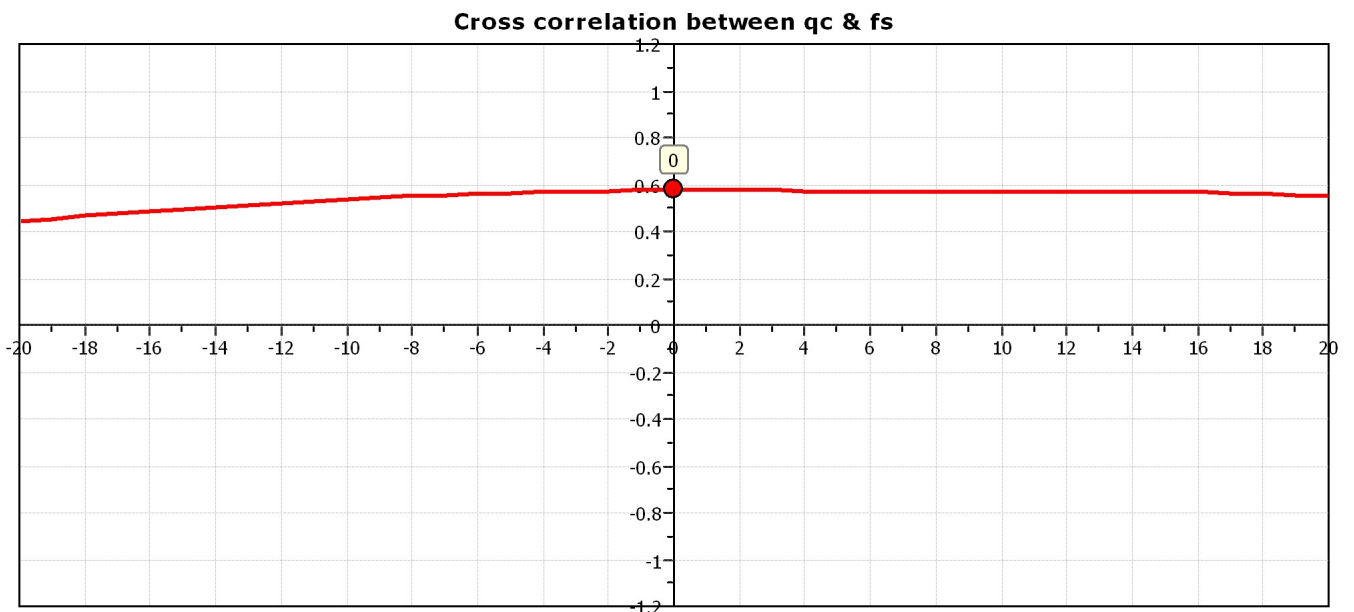
*prove penetrometriche statiche CPT / CPTU*



**Project:**  
**Location:**



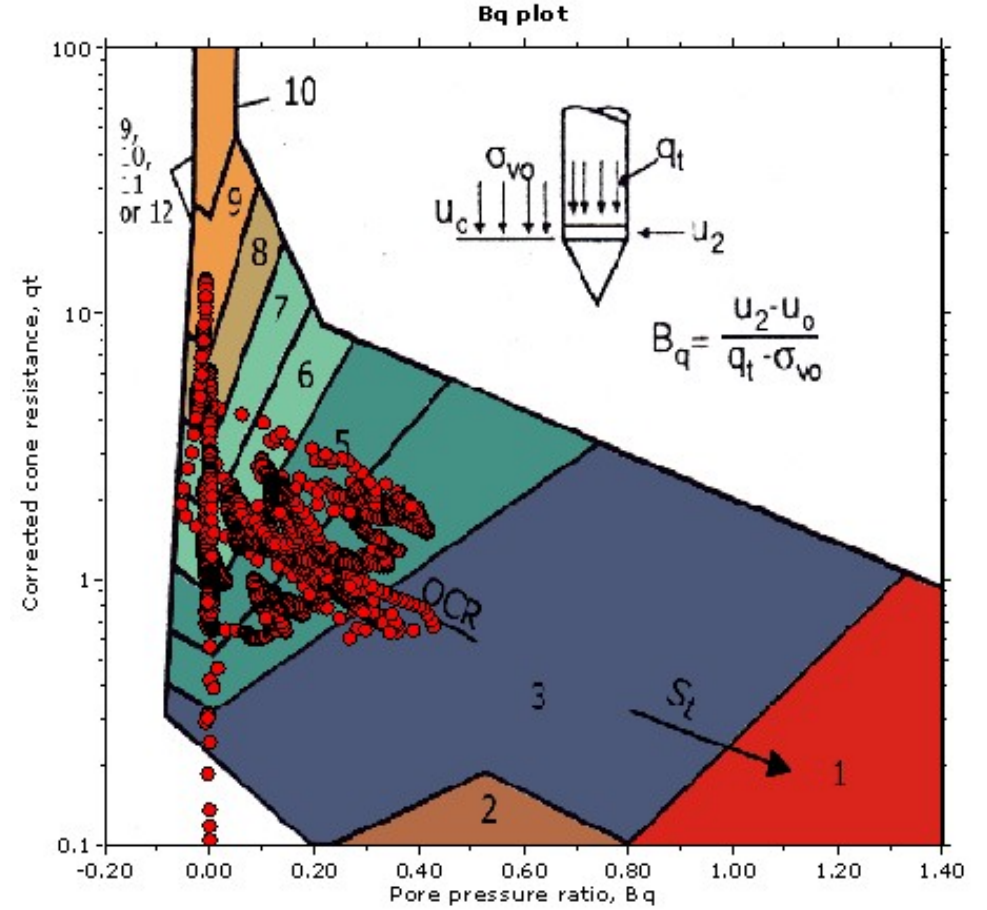
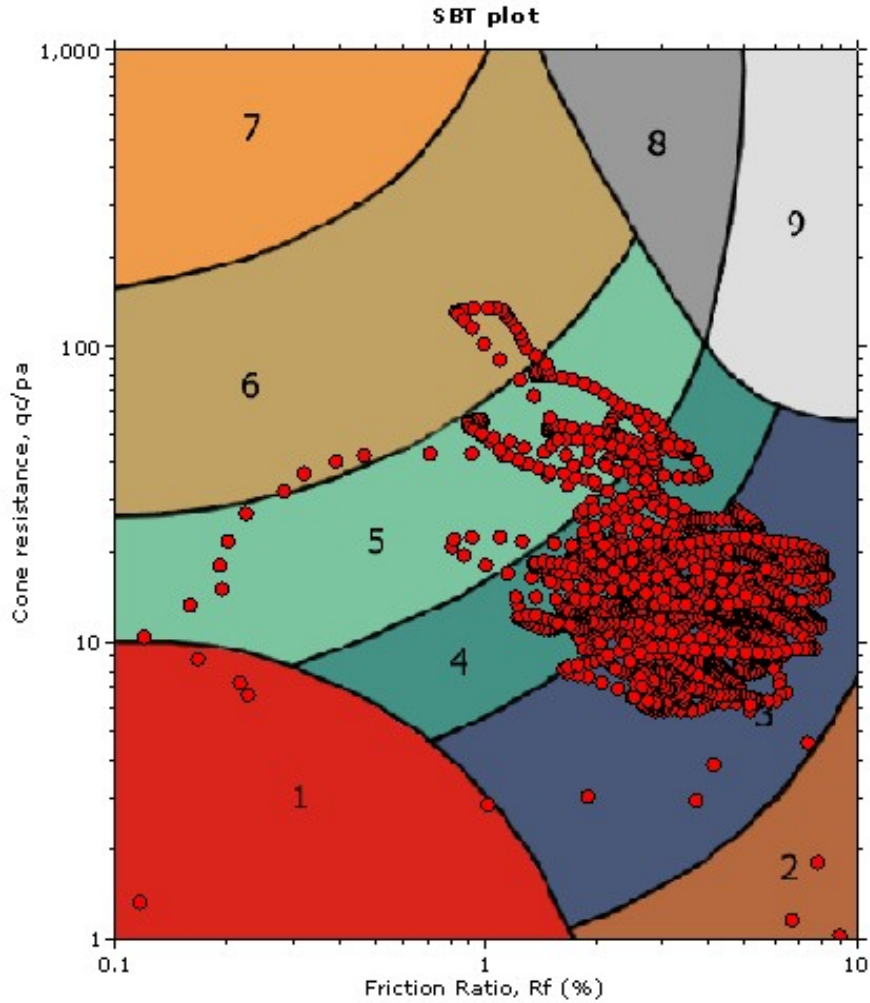
The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).





**Project:**  
**Location:**

**SBT - Bq plots**



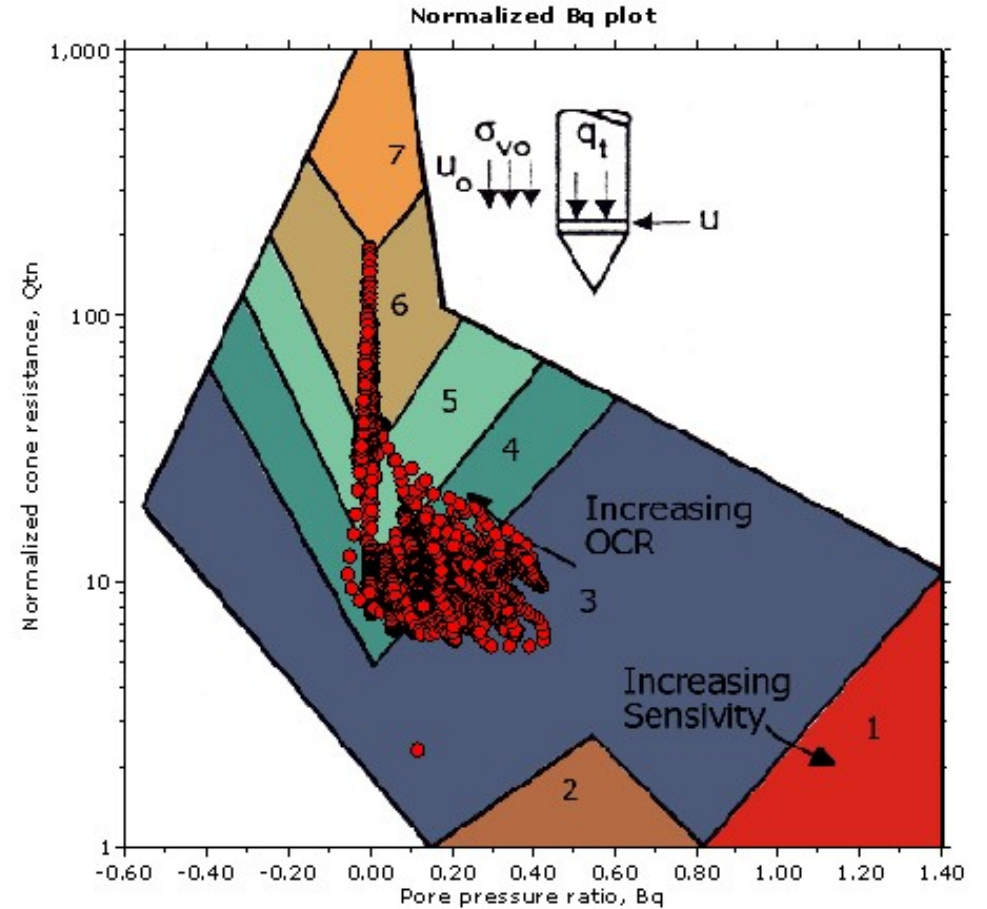
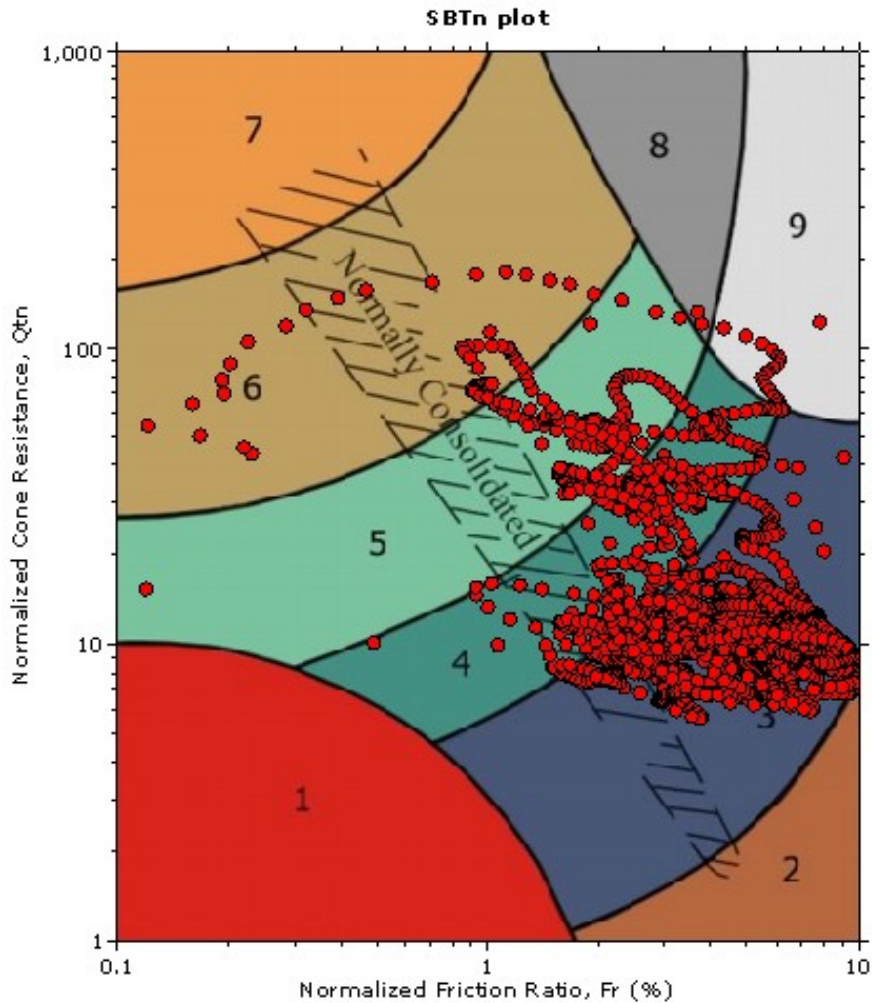
**SBT legend**

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |



**Project:**  
**Location:**

**SBT - Bq plots (normalized)**



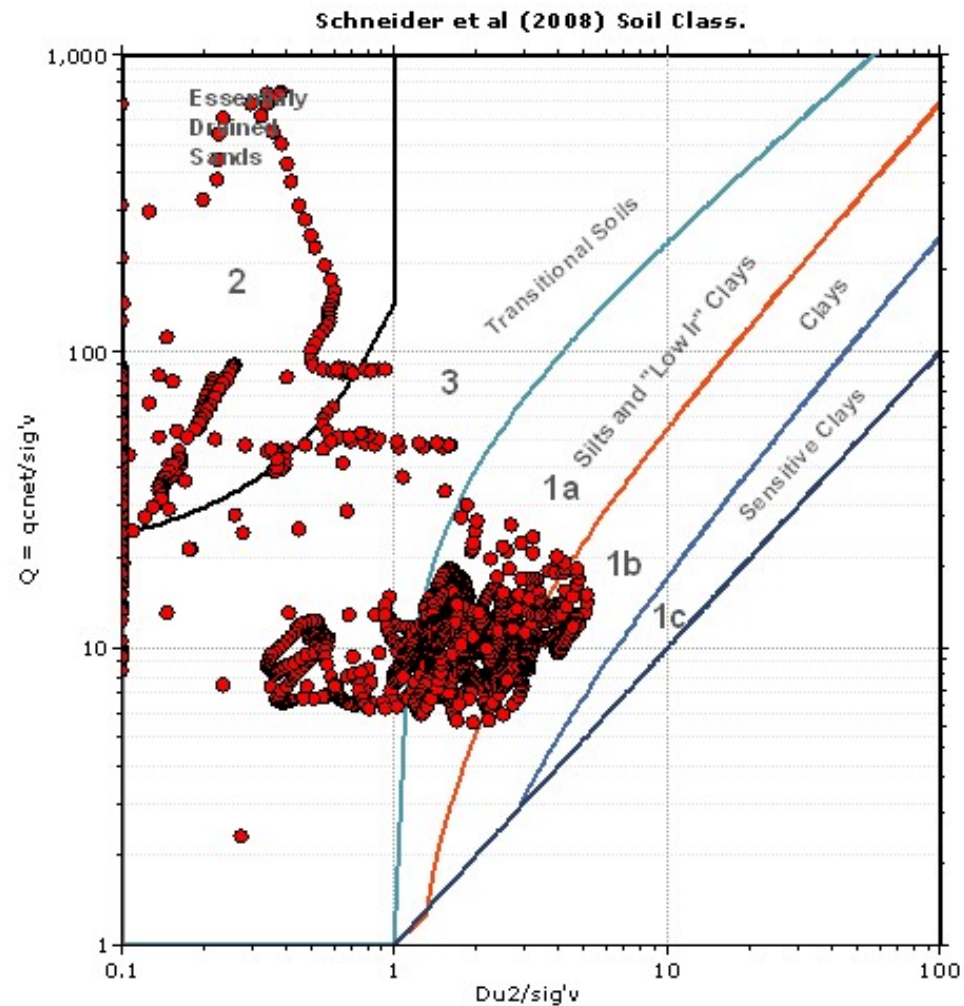
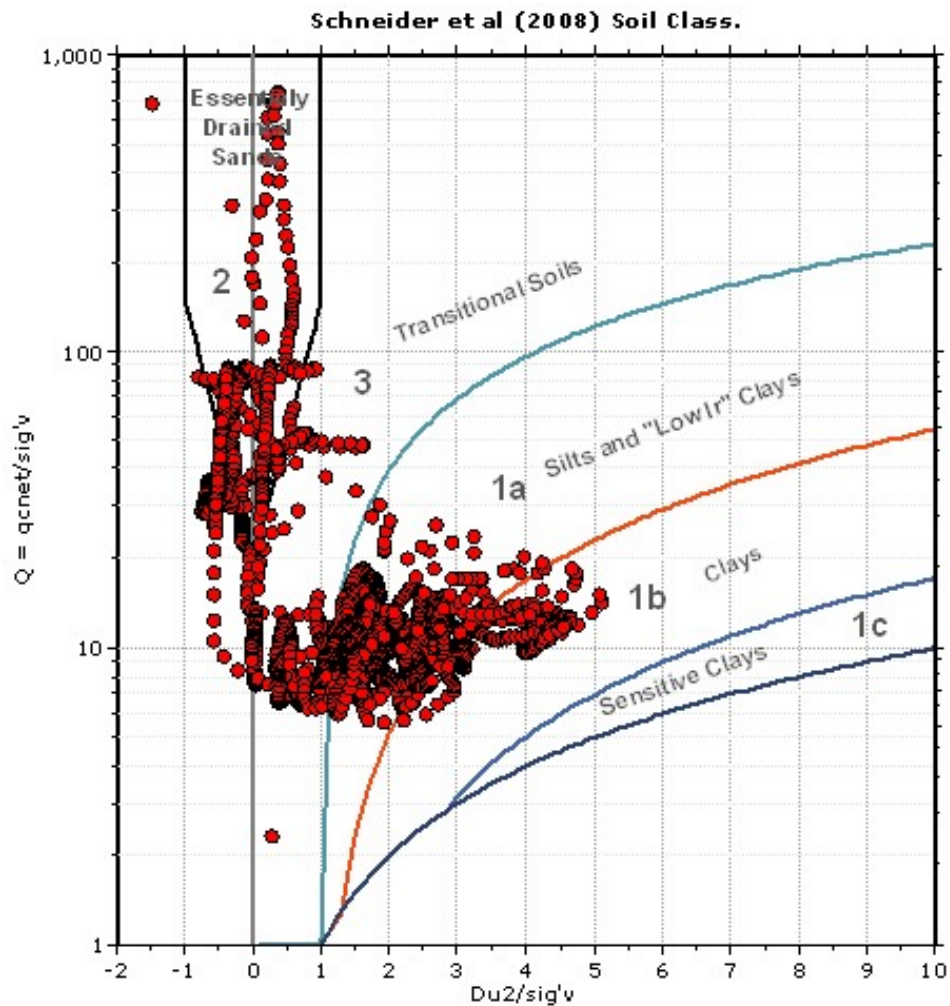
**SBTn legend**

- |  |   |   |
|--|---|---|
| <span style="color: red;">■</span> 1. Sensitive fine grained | <span style="color: teal;">■</span> 4. Clayey silt to silty clay      | <span style="color: orange;">■</span> 7. Gravely sand to sand         |
| <span style="color: brown;">■</span> 2. Organic material     | <span style="color: lightgreen;">■</span> 5. Silty sand to sandy silt | <span style="color: grey;">■</span> 8. Very stiff sand to clayey sand |
| <span style="color: blue;">■</span> 3. Clay to silty clay    | <span style="color: tan;">■</span> 6. Clean sand to silty sand        | <span style="color: lightgrey;">■</span> 9. Very stiff fine grained   |



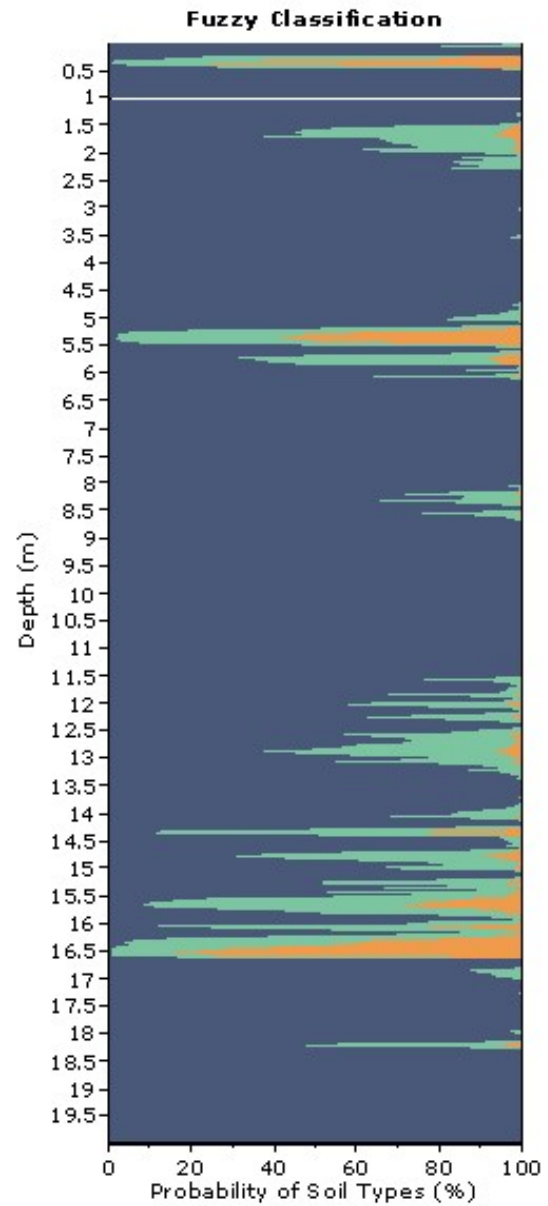
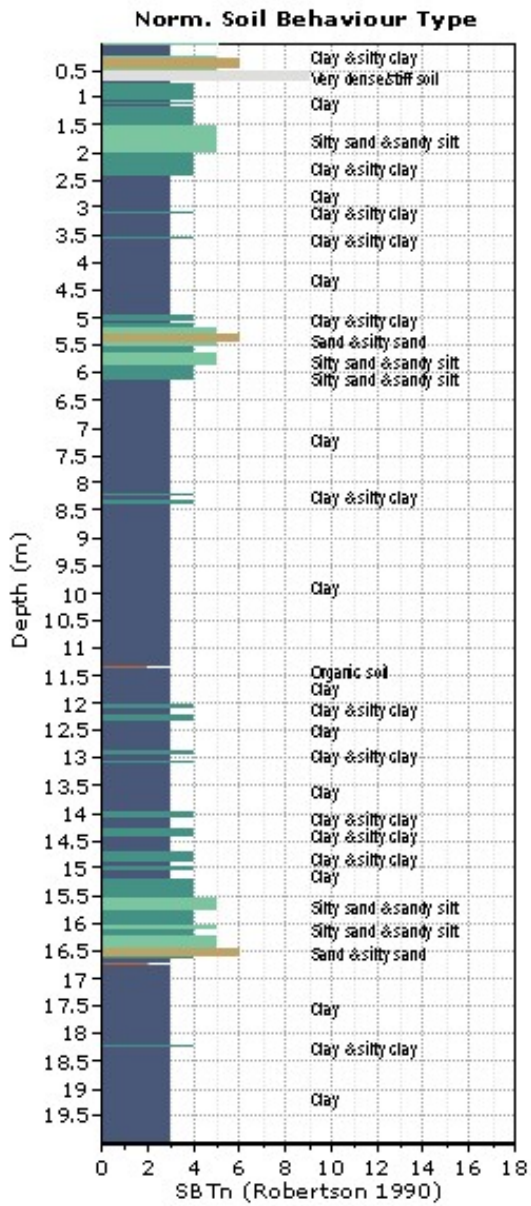
**Project:**  
**Location:**

**Bq plots (Schneider)**



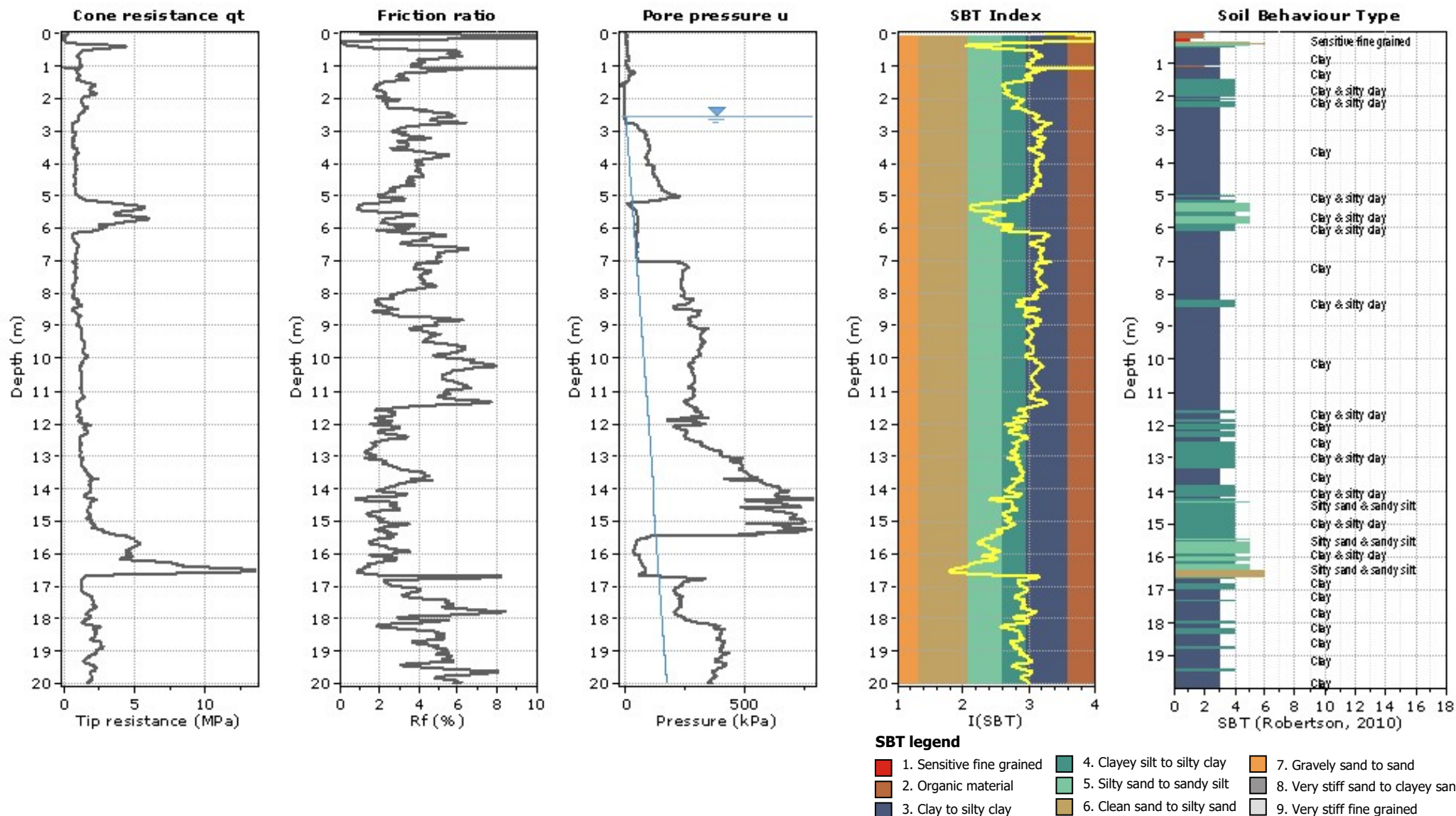
**Project:**

**Location:**

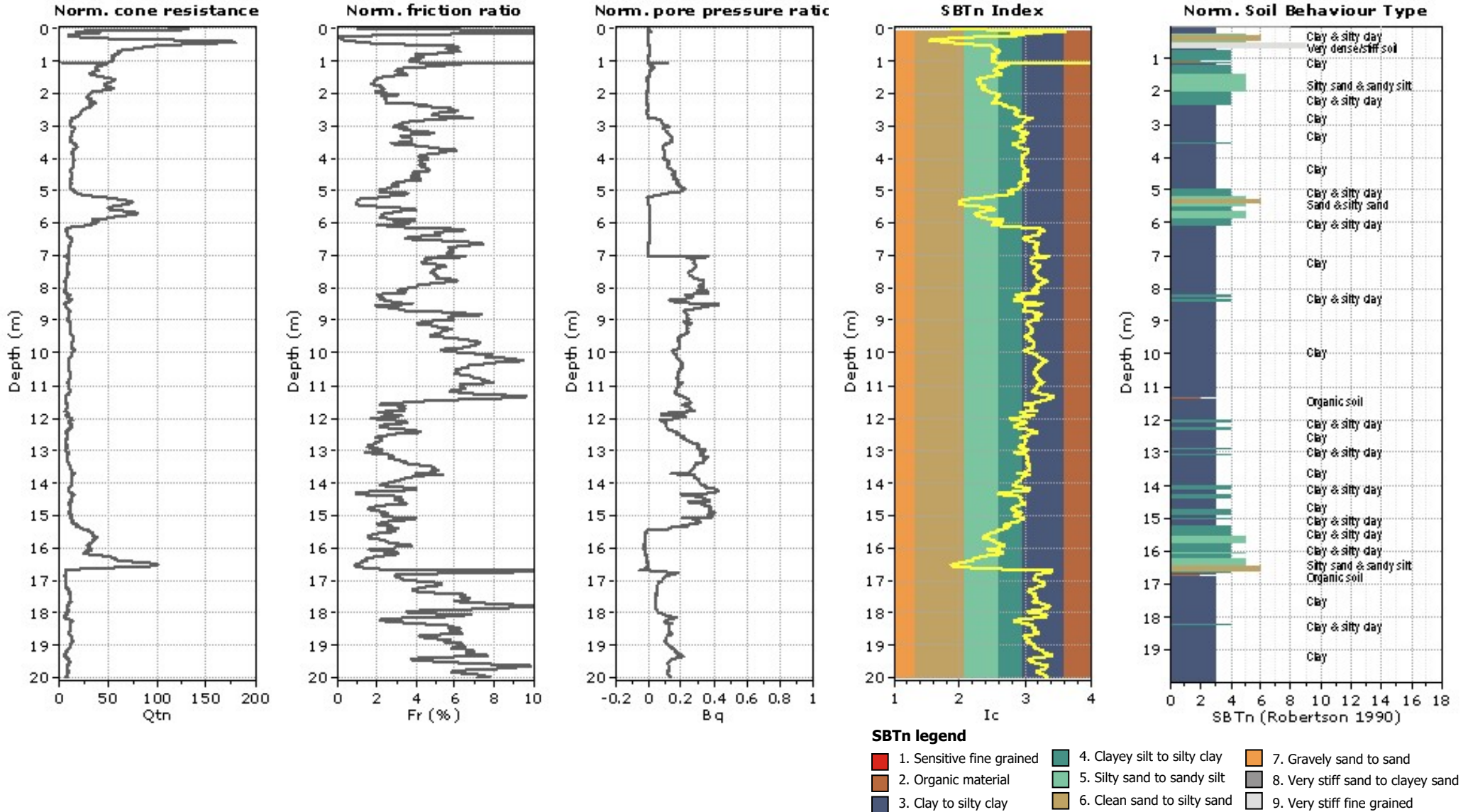


Project:

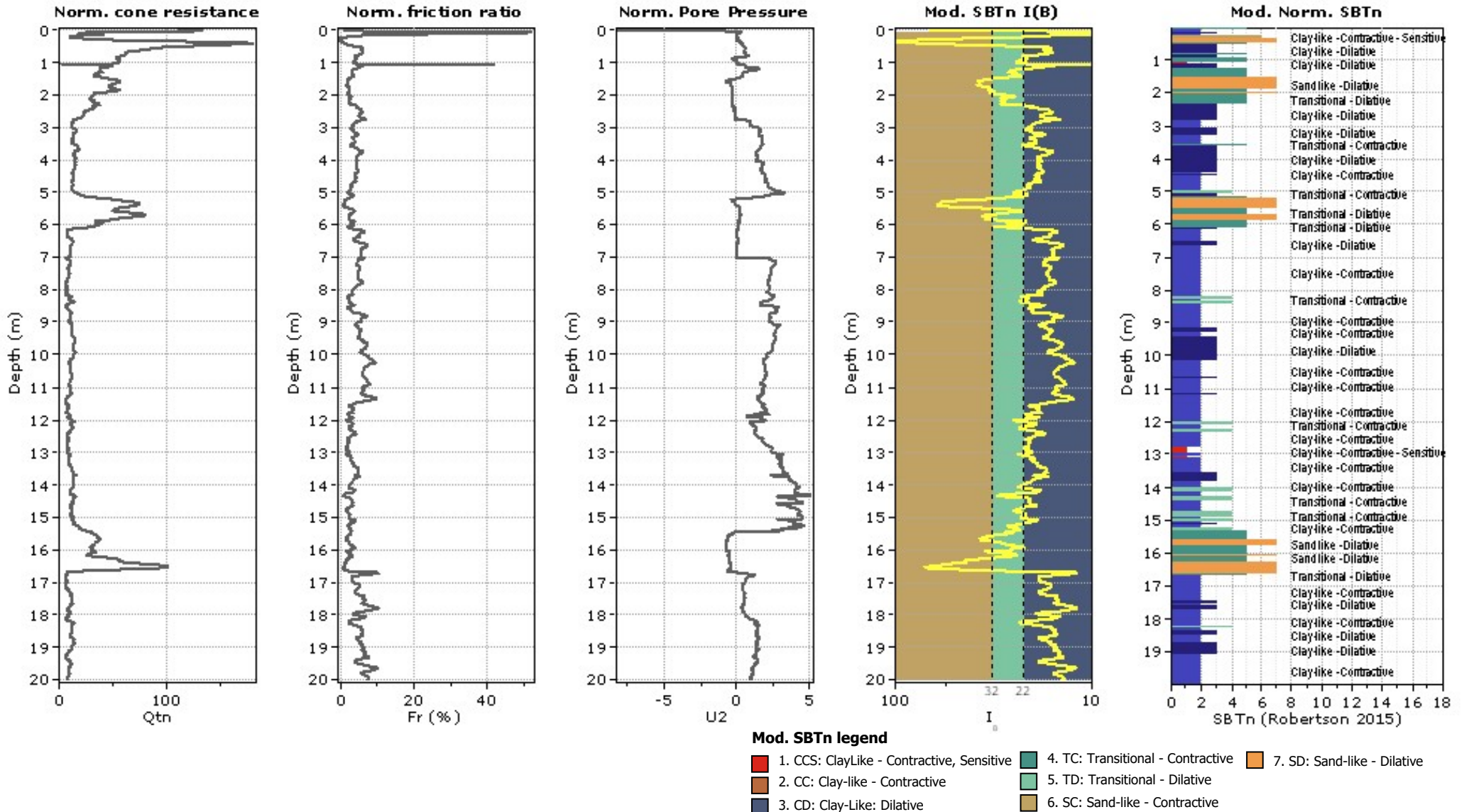
Location:



Project:  
Location:



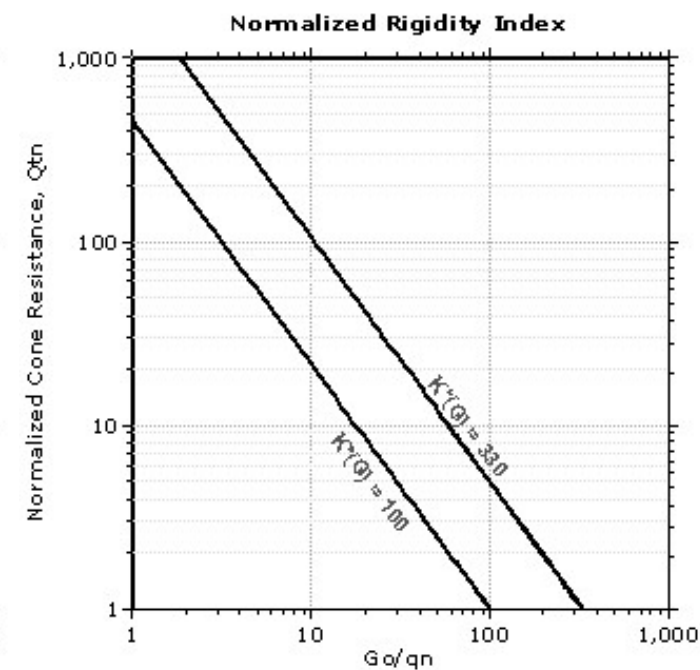
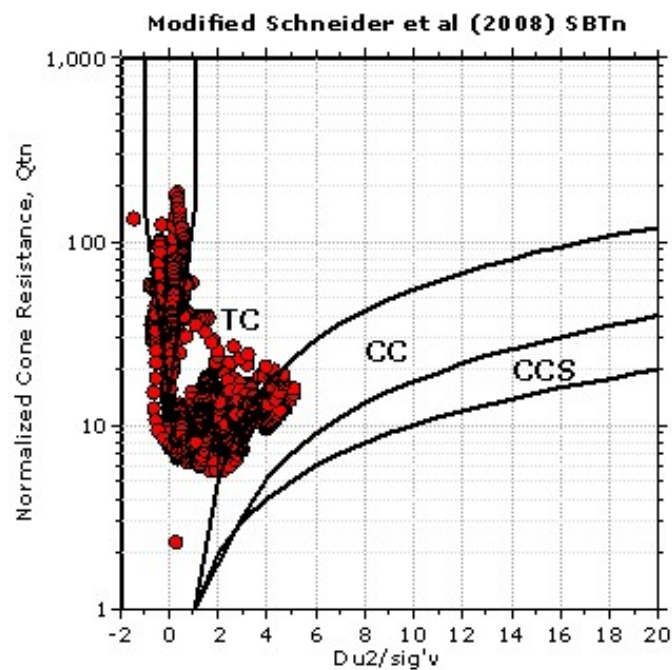
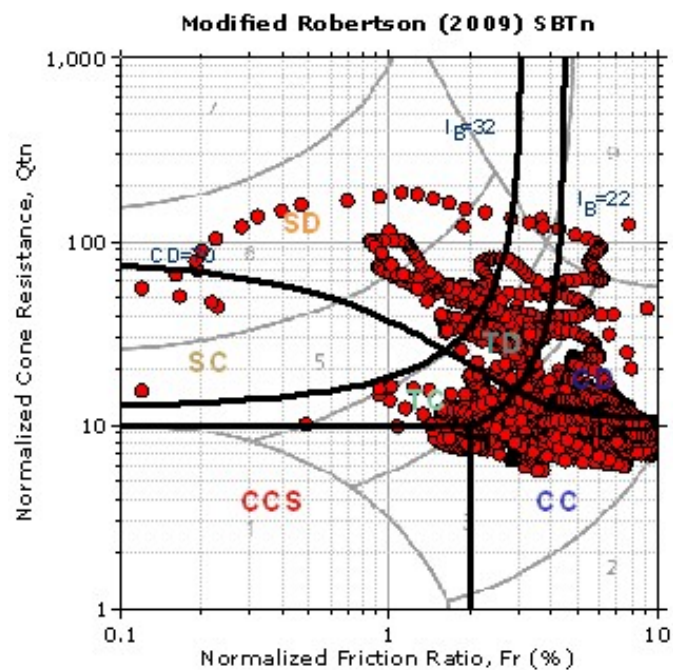
Project:  
Location:



**Project:**

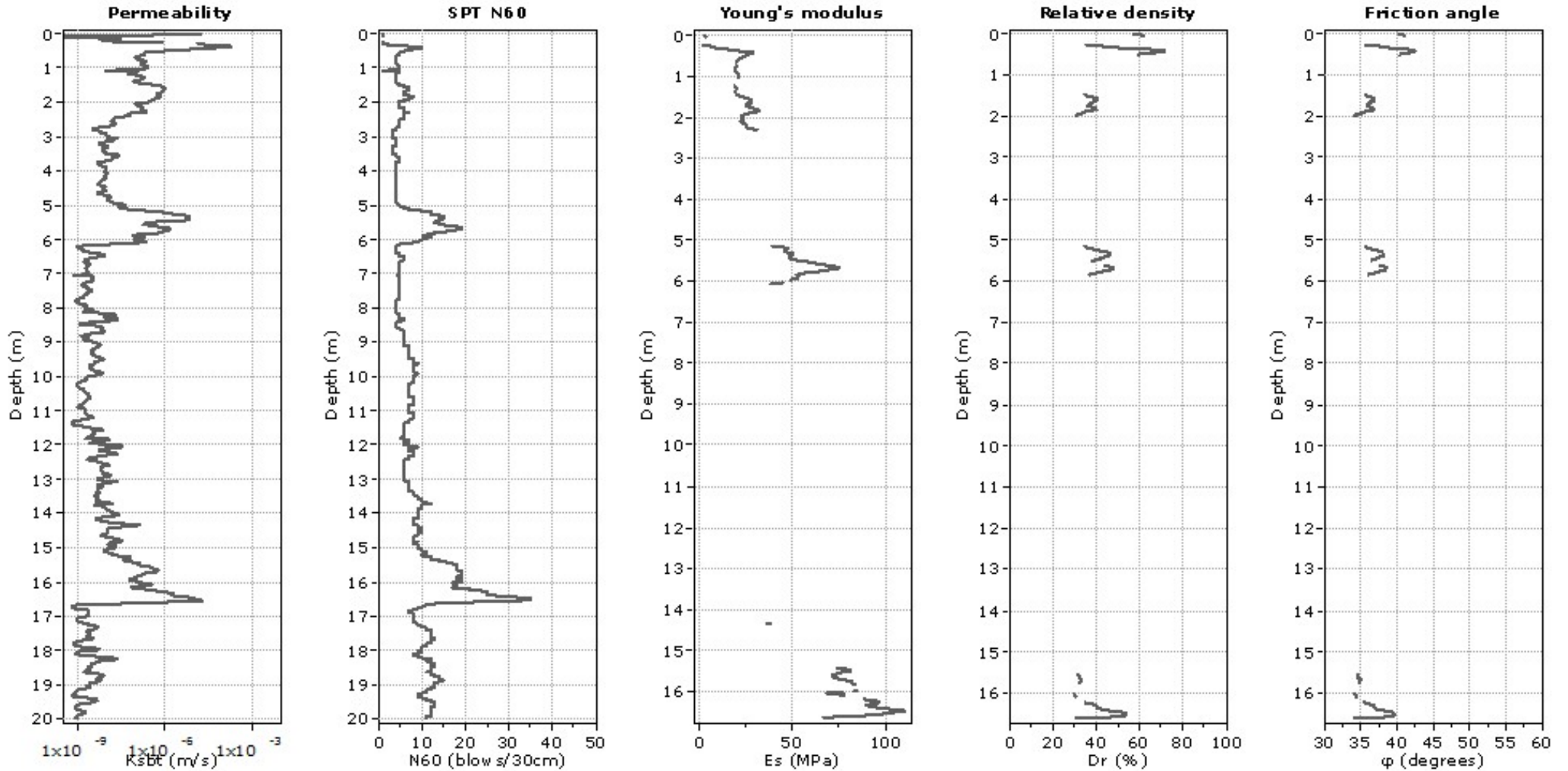
**Location:**

**Updated SBTn plots**



- CCS: Clay-like - Contractive - Sensitive
- CC: Clay-like - Contractive
- CD: Clay-like - Dilative
- TC: Transitional - Contractive
- TD: Transitional - Dilative
- SC: Sand-like - Contractive
- SD: Sand-like - Dilative

**Project:**  
**Location:**



**Calculation parameters**

Permeability: Based on  $SBT_n$

SPT  $N_{60}$ : Based on  $I_c$  and  $q_t$

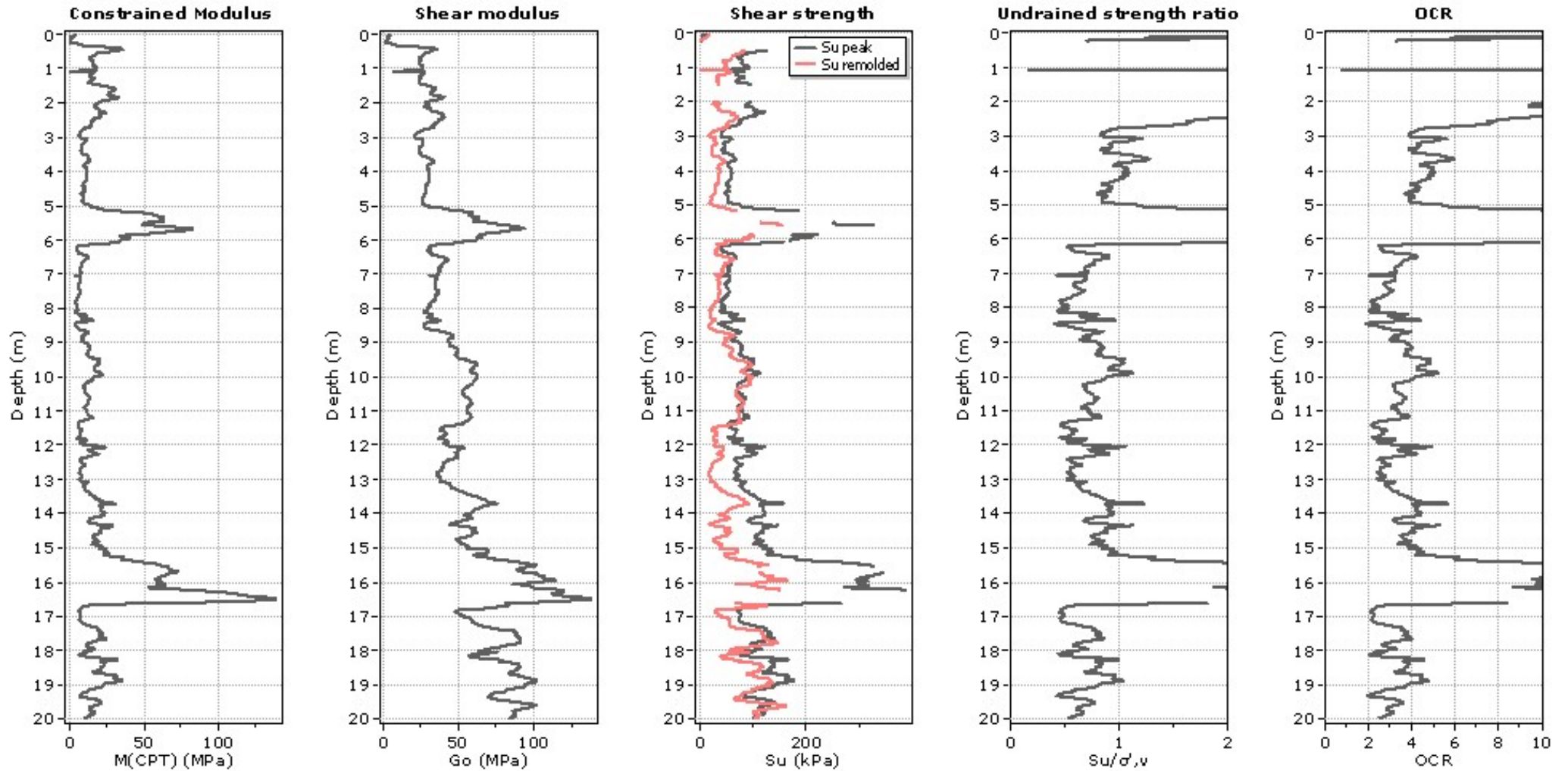
Young's modulus: Based on variable alpha using  $I_c$  (Robertson, 2009)

Relative density constant,  $C_D$ : 350.0

Phi: Based on Kulhavy & Mayne (1990)

● — User defined estimation data

**Project:**  
**Location:**



**Calculation parameters**

Constrained modulus: Based on variable  $\alpha$  using  $I_c$  and  $Q_{tn}$  (Robertson, 2009)

Go: Based on variable  $\alpha$  using  $I_c$  (Robertson, 2009)

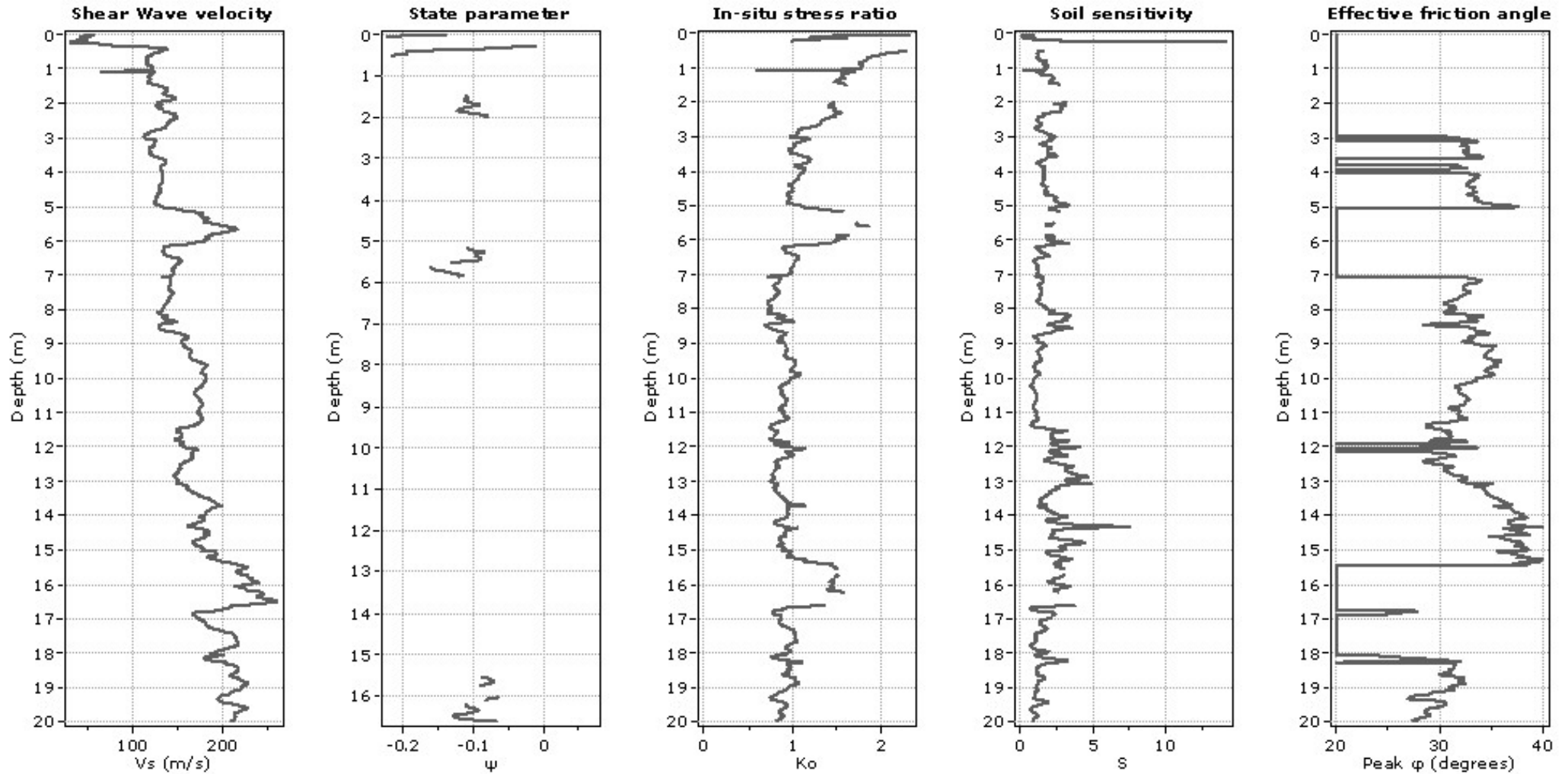
Undrained shear strength cone factor for clays,  $N_{kt}$ : 14

OCR factor for clays,  $N_{kt}$ : 0.33

● User defined estimation data

● Flat Dilatometer Test data

**Project:**  
**Location:**

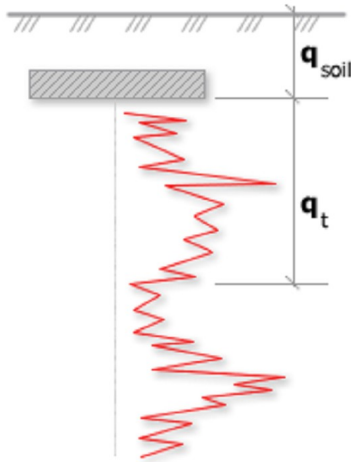


**Calculation parameters**

Soil Sensitivity factor,  $N_s$ : 7.00

—●— User defined estimation data

**Project:**  
**Location:**

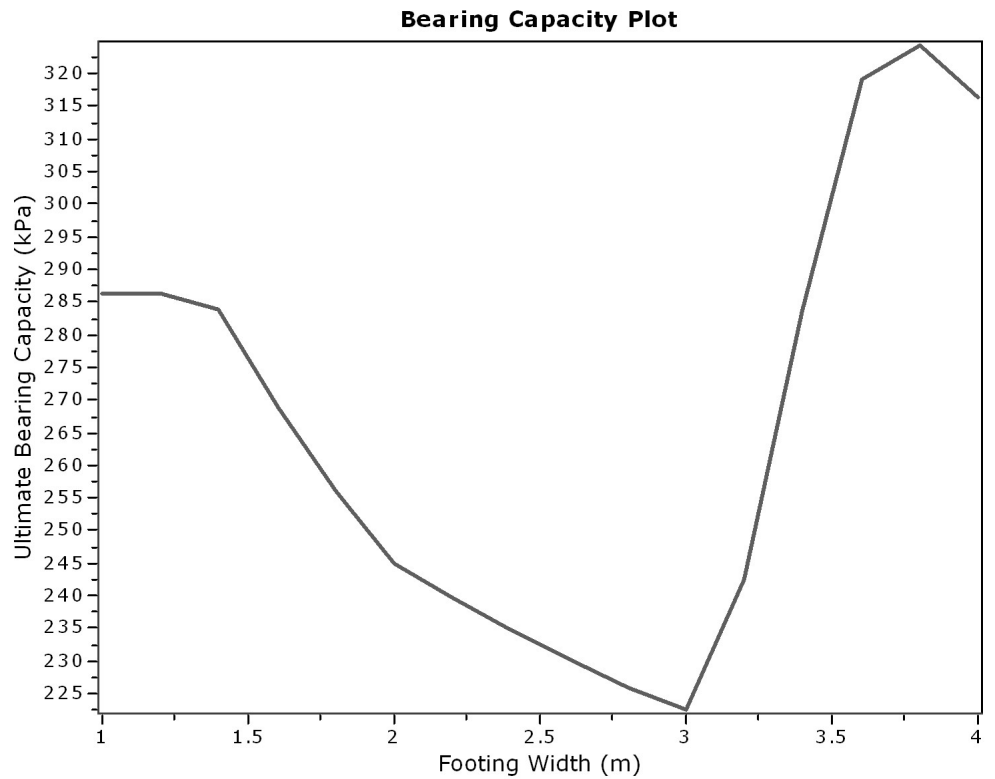


Bearing Capacity calculation is performed based on the formula:

$$Q_{ult} = R_k \times q_t + q_{soil}$$

where:

- $R_k$ : Bearing capacity factor
- $q_t$ : Average corrected cone resistance over calculation depth
- $q_{soil}$ : Pressure applied by soil above footing



**:: Tabular results ::**

No	B (m)	Start Depth (m)	End Depth (m)	Ave. $q_t$ (MPa)	$R_k$	Soil Press. (kPa)	Ult. bearing cap. (kPa)
1	1.00	0.50	2.00	1.38	0.20	9.50	286.19
2	1.20	0.50	2.30	1.38	0.20	9.50	286.21
3	1.40	0.50	2.60	1.37	0.20	9.50	283.87
4	1.60	0.50	2.90	1.30	0.20	9.50	268.98
5	1.80	0.50	3.20	1.23	0.20	9.50	255.89
6	2.00	0.50	3.50	1.18	0.20	9.50	244.84
7	2.20	0.50	3.80	1.15	0.20	9.50	239.87
8	2.40	0.50	4.10	1.13	0.20	9.50	234.72
9	2.60	0.50	4.40	1.10	0.20	9.50	230.26
10	2.80	0.50	4.70	1.08	0.20	9.50	225.83
11	3.00	0.50	5.00	1.07	0.20	9.50	222.57
12	3.20	0.50	5.30	1.17	0.20	9.50	242.64
13	3.40	0.50	5.60	1.37	0.20	9.50	283.57
14	3.60	0.50	5.90	1.55	0.20	9.50	319.06
15	3.80	0.50	6.20	1.57	0.20	9.50	324.32
16	4.00	0.50	6.50	1.53	0.20	9.50	316.31

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

**:: Unit Weight,  $g$  (kN/m<sup>3</sup>) ::**

$$g = g_w \cdot \left( 0.27 \cdot \log(R_f) + 0.36 \cdot \log\left(\frac{q_t}{p_a}\right) + 1.236 \right)$$

where  $g_w$  = water unit weight

**:: Permeability,  $k$  (m/s) ::**

$$I_c < 3.27 \text{ and } I_c > 1.00 \text{ then } k = 10^{0.952 - 3.04 I_c}$$

$$I_c \leq 4.00 \text{ and } I_c > 3.27 \text{ then } k = 10^{-4.52 - 1.37 I_c}$$

**:: N<sub>SPT</sub> (blows per 30 cm) ::**

$$N_{60} = \left( \frac{q_c}{p_a} \right) \cdot \frac{1}{10^{1.1268 - 0.2817 I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268 - 0.2817 I_c}}$$

**:: Young's Modulus,  $E_s$  (MPa) ::**

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 I_c + 1.68}$$

(applicable only to  $I_c < I_{c\_cutoff}$ )

**:: Relative Density,  $D_r$  (%) ::**

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}} \quad \text{(applicable only to SBT}_n\text{: 5, 6, 7 and 8 or } I_c < I_{c\_cutoff}\text{)}$$

**:: State Parameter,  $\psi$  ::**

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

**:: Peak drained friction angle,  $\phi$  (°) ::**

$$\phi = 17.60 + 11 \cdot \log(Q_{tn})$$

(applicable only to SBT<sub>n</sub>: 5, 6, 7 and 8)

**:: 1-D constrained modulus,  $M$  (MPa) ::**

If  $I_c > 2.20$   
 $a = 14$  for  $Q_{tn} > 14$   
 $a = Q_{tn}$  for  $Q_{tn} \leq 14$   
 $M_{CPT} = a \cdot (q_t - \sigma_v)$

If  $I_c \leq 2.20$   
 $M_{CPT} = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 I_c + 1.68}$

**:: Small strain shear Modulus,  $G_0$  (MPa) ::**

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 I_c + 1.68}$$

**:: Shear Wave Velocity,  $V_s$  (m/s) ::**

$$V_s = \left( \frac{G_0}{\rho} \right)^{0.50}$$

**:: Undrained peak shear strength,  $S_u$  (kPa) ::**

$$N_{kt} = 10.50 + 7 \cdot \log(F_r) \text{ or user defined}$$

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT<sub>n</sub>: 1, 2, 3, 4 and 9 or  $I_c > I_{c\_cutoff}$ )

**:: Remolded undrained shear strength,  $S_u(rem)$  (kPa) ::**

$$S_{u(rem)} = f_s \quad \text{(applicable only to SBT}_n\text{: 1, 2, 3, 4 and 9 or } I_c > I_{c\_cutoff}\text{)}$$

**:: Overconsolidation Ratio, OCR ::**

$$k_{OCR} = \left[ \frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 + 7 \cdot \log(F_r))} \right]^{1.25} \text{ or user defined}$$

$$OCR = k_{OCR} \cdot Q_{tn}$$

(applicable only to SBT<sub>n</sub>: 1, 2, 3, 4 and 9 or  $I_c > I_{c\_cutoff}$ )

**:: In situ Stress Ratio,  $K_0$  ::**

$$K_0 = (1 - \sin \phi') \cdot OCR^{\sin \phi'}$$

(applicable only to SBT<sub>n</sub>: 1, 2, 3, 4 and 9 or  $I_c > I_{c\_cutoff}$ )

**:: Soil Sensitivity,  $S_t$  ::**

$$S_t = \frac{N_s}{F_r}$$

(applicable only to SBT<sub>n</sub>: 1, 2, 3, 4 and 9 or  $I_c > I_{c\_cutoff}$ )

**:: Effective Stress Friction Angle,  $\phi'$  (°) ::**

$$\phi' = 29.5^\circ \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for  $0.10 < B_q < 1.00$ )

**References**

- Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5<sup>th</sup> Edition, November 2012
- Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)



**PROVA PENETROMETRICA STATICA MECCANICA**  
**LETTURE CAMPAGNA: PUNTA, LATERALE, TOTALE**

n°	<b>1</b>
riferimento	034-08
certificato n°	4445

Committente: Studio Tecnico	U.M.: MPa	Data eseg.: 12/03/2008
Cantiere: Studio del terreno di fondazione	Pagina: 1/4	Data certificato: 12/03/2008
Località: Medolla - via San Matteo	Elaborato:	Preforo: m
		Falda: -3,00 m da quota 0.00

H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %	H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %
0,20	0,00	0,00		0,00	0,00			15,20	18,00	31,00		1,76	98,00	18	5,6
0,40	0,00	0,00		0,00	26,46	0		15,40	13,00	28,00		1,27	78,40	16	6,2
0,60	12,00	16,00		1,18	46,06	26	3,9	15,60	36,00	48,00		3,53	183,26	19	5,2
0,80	12,00	19,00		1,18	51,94	23	4,4	15,80	22,00	50,00		2,16	144,06	15	6,7
1,00	11,00	19,00		1,08	46,06	23	4,3	16,00	20,00	42,00		1,96	130,34	15	6,7
1,20	21,00	28,00		2,06	39,20	53	1,9	16,20	26,00	46,00		2,55	124,46	20	4,9
1,40	21,00	27,00		2,06	65,66	31	3,2	16,40	28,00	47,00		2,74	144,06	19	5,3
1,60	22,00	32,00		2,16	26,46	81	1,2	16,60	28,00	50,00		2,74	137,20	20	5,0
1,80	43,00	47,00		4,21	85,26	49	2,0	16,80	29,00	50,00		2,84	104,86	27	3,7
2,00	15,00	28,00		1,47	71,54	21	4,9	17,00	18,00	34,00		1,76	65,66	27	3,7
2,20	15,00	26,00		1,47	58,80	25	4,0	17,20	48,00	58,00		4,70	130,34	36	2,8
2,40	11,00	20,00		1,08	51,94	21	4,8	17,40	26,00	46,00		2,55	130,34	20	5,1
2,60	8,00	16,00		0,78	46,06	17	5,9	17,60	28,00	48,00		2,74	137,20	20	5,0
2,80	8,00	15,00		0,78	32,34	24	4,1	17,80	33,00	54,00		3,23	149,94	22	4,6
3,00	9,00	14,00		0,88	51,94	17	5,9	18,00	31,00	54,00		3,04	169,54	18	5,6
3,20	9,00	17,00		0,88	46,06	19	5,2	18,20	28,00	54,00		2,74	144,06	19	5,3
3,40	6,00	13,00		0,59	26,46	22	4,5	18,40	20,00	42,00		1,96	130,34	15	6,7
3,60	13,00	17,00		1,27	39,20	33	3,1	18,60	28,00	48,00		2,74	169,54	16	6,2
3,80	13,00	19,00		1,27	46,06	28	3,6	18,80	40,00	66,00		3,92	208,74	19	5,3
4,00	10,00	17,00		0,98	26,46	37	2,7	19,00	32,00	64,00		3,14	196,00	16	6,3
4,20	12,00	16,00		1,18	58,80	20	5,0	19,20	28,00	58,00		2,74	183,26	15	6,7
4,40	10,00	19,00		0,98	32,34	30	3,3	19,40	26,00	54,00		2,55	149,94	17	5,9
4,60	19,00	24,00		1,86	71,54	26	3,8	19,60	18,00	41,00		1,76	124,46	14	7,1
4,80	9,00	20,00		0,88	26,46	33	3,0	19,80	19,00	38,00		1,86	117,60	16	6,3
5,00	22,00	26,00		2,16	85,26	25	4,0	20,00	22,00	40,00		2,16	144,06	15	6,7
5,20	11,00	24,00		1,08	39,20	28	3,6	20,20	25,00	47,00		2,45	144,06	17	5,9
5,40	9,00	15,00		0,88	32,34	27	3,7	20,40	20,00	42,00		1,96	130,34	15	6,7
5,60	8,00	13,00		0,78	46,06	17	5,9	20,60	16,00	36,00		1,57	117,60	13	7,5
5,80	7,00	14,00		0,69	39,20	18	5,7	20,80	22,00	40,00		2,16	144,06	15	6,7
6,00	8,00	14,00		0,78	32,34	24	4,1	21,00	24,00	46,00		2,35	149,94	16	6,4
6,20	9,00	14,00		0,88	51,94	17	5,9	21,20	21,00	44,00		2,06	137,20	15	6,7
6,40	7,00	15,00		0,69	39,20	18	5,7	21,40	19,00	40,00		1,86	149,94	12	8,1
6,60	15,00	21,00		1,47	85,26	17	5,8	21,60	19,00	42,00		1,86	130,34	14	7,0
6,80	13,00	26,00		1,27	71,54	18	5,6	21,80	20,00	40,00		1,96	117,60	17	6,0
7,00	11,00	22,00		1,08	78,40	14	7,3	22,00	18,00	36,00		1,76	117,60	15	6,7
7,20	14,00	26,00		1,37	85,26	16	6,2	22,20	20,00	38,00		1,96	39,20	50	2,0
7,40	12,00	25,00		1,18	58,80	20	5,0	22,40	68,00	74,00		6,66	26,46	252	0,4
7,60	13,00	22,00		1,27	58,80	22	4,6	22,60	38,00	42,00		3,72	144,06	26	3,9
7,80	13,00	22,00		1,27	58,80	22	4,6	22,80	24,00	46,00		2,35	130,34	18	5,5
8,00	13,00	22,00		1,27	71,54	18	5,6	23,00	22,00	42,00		2,16	117,60	18	5,5
8,20	14,00	25,00		1,37	78,40	18	5,7	23,20	24,00	42,00		2,35	124,46	19	5,3
8,40	16,00	28,00		1,57	78,40	20	5,0	23,40	19,00	38,00		1,86	137,20	14	7,4
8,60	16,00	28,00		1,57	78,40	20	5,0	23,60	17,00	38,00		1,67	144,06	12	8,6
8,80	14,00	26,00		1,37	58,80	23	4,3	23,80	48,00	70,00		4,70	183,26	26	3,9
9,00	17,00	26,00		1,67	104,86	16	6,3	24,00	26,00	54,00		2,55	183,26	14	7,2
9,20	16,00	32,00		1,57	110,74	14	7,1	24,20	25,00	53,00		2,45	156,80	16	6,4
9,40	21,00	38,00		2,06	117,60	18	5,7	24,40	26,00	50,00		2,55	130,34	20	5,1
9,60	24,00	42,00		2,35	144,06	16	6,1	24,60	82,00	102,00		8,04	247,94	32	3,1
9,80	24,00	46,00		2,35	149,94	16	6,4	24,80	74,00	112,00		7,25	183,26	40	2,5
10,00	24,00	47,00		2,35	149,94	16	6,4	25,00	50,00	78,00		4,90	189,14	26	3,9
10,20	23,00	46,00		2,25	144,06	16	6,4	25,20	46,00	75,00		4,51	222,46	20	4,9
10,40	16,00	38,00		1,57	110,74	14	7,1	25,40	44,00	78,00		4,31	261,66	16	6,1
10,60	18,00	35,00		1,76	124,46	14	7,1	25,60	64,00	104,00		6,27	242,06	26	3,9
10,80	18,00	37,00		1,76	117,60	15	6,7	25,80	56,00	93,00		5,49	300,86	18	5,5
11,00	20,00	38,00		1,96	117,60	17	6,0	26,00	85,00	131,00		8,33	424,34	20	5,1
11,20	19,00	37,00		1,86	124,46	15	6,7	26,20	128,00	193,00		12,54	404,74	31	3,2
11,40	19,00	38,00		1,86	110,74	17	5,9	26,40	126,00	188,00		12,35	313,60	39	2,5
11,60	15,00	32,00		1,47	85,26	17	5,8	26,60	50,00	98,00		4,90	169,54	29	3,5
11,80	11,00	24,00		1,08	65,66	16	6,1	26,80	17,00	43,00		1,67	300,86	6	18,1
12,00	11,00	21,00		1,08	46,06	23	4,3	27,00	132,00	178,00		12,94	254,80	51	2,0
12,20	9,00	16,00		0,88	32,34	27	3,7	27,20	134,00	173,00		13,13	91,14	144	0,7
12,40	11,00	16,00		1,08	39,20	28	3,6	27,40	106,00	120,00		10,39	196,00	53	1,9
12,60	17,00	23,00		1,67	78,40	21	4,7	27,60	54,00	84,00		5,29	470,40	11	8,9
12,80	19,00	31,00		1,86	98,00	19	5,3	27,80	118,00	190,00		11,56	438,06	26	3,8
13,00	19,00	34,00		1,86	78,40	24	4,2	28,00	235,00	302,00		23,03	340,06	68	1,5
13,20	14,00	26,00		1,37	71,54	19	5,2	28,20	276,00	328,00		27,05	228,34	118	0,8
13,40	13,00	24,00		1,27	78,40	16	6,2	28,40	283,00	318,00		27,73	163,66	169	0,6
13,60	16,00	28,00		1,57	130,34	12	8,3	28,60	263,00	288,00		25,77	149,94	172	0,6
13,80	21,00	41,00		2,06	130,34	16	6,3	28,80	245,00	268,00		24,01	463,54	52	1,9
14,00	28,00	48,00		2,74	130,34	21	4,8	29,00	192,00	263,00		18,82	431,20	44	2,3
14,20	22,00	42,00		2,16	117,60	18	5,5	29,20	280,00	346,00		27,44	326,34	84	1,2
14,40	18,00	36,00		1,76	91,14	19	5,2	29,40	300,00	350,00		29,40	306,74	96	1,0
14,60	17,00	31,00		1,67	104,86	16	6,3	29,60	303,00	350,00		29,69	294,00	101	1,0
14,80	22,00	38,00		2,16	85,26	25	4,0	29,80	305,00	350,00		29,89	281,26	106	0,9
15,00	18,00	31,00		1,76	85,26	21	4,8	30,00	307,00	350,00		30,09			

H = profondità  
L1 = prima lettura (punta)  
L2 = seconda lettura (punta + laterale)  
Lt = terza lettura (totale)

qc = resistenza di punta  
fs = resistenza laterale calcolata  
0.20 m sopra quota di qc  
F = rapporto di Begemann (qc / fs)  
Fr = rapporto di Schmertmann (fs / qc)%



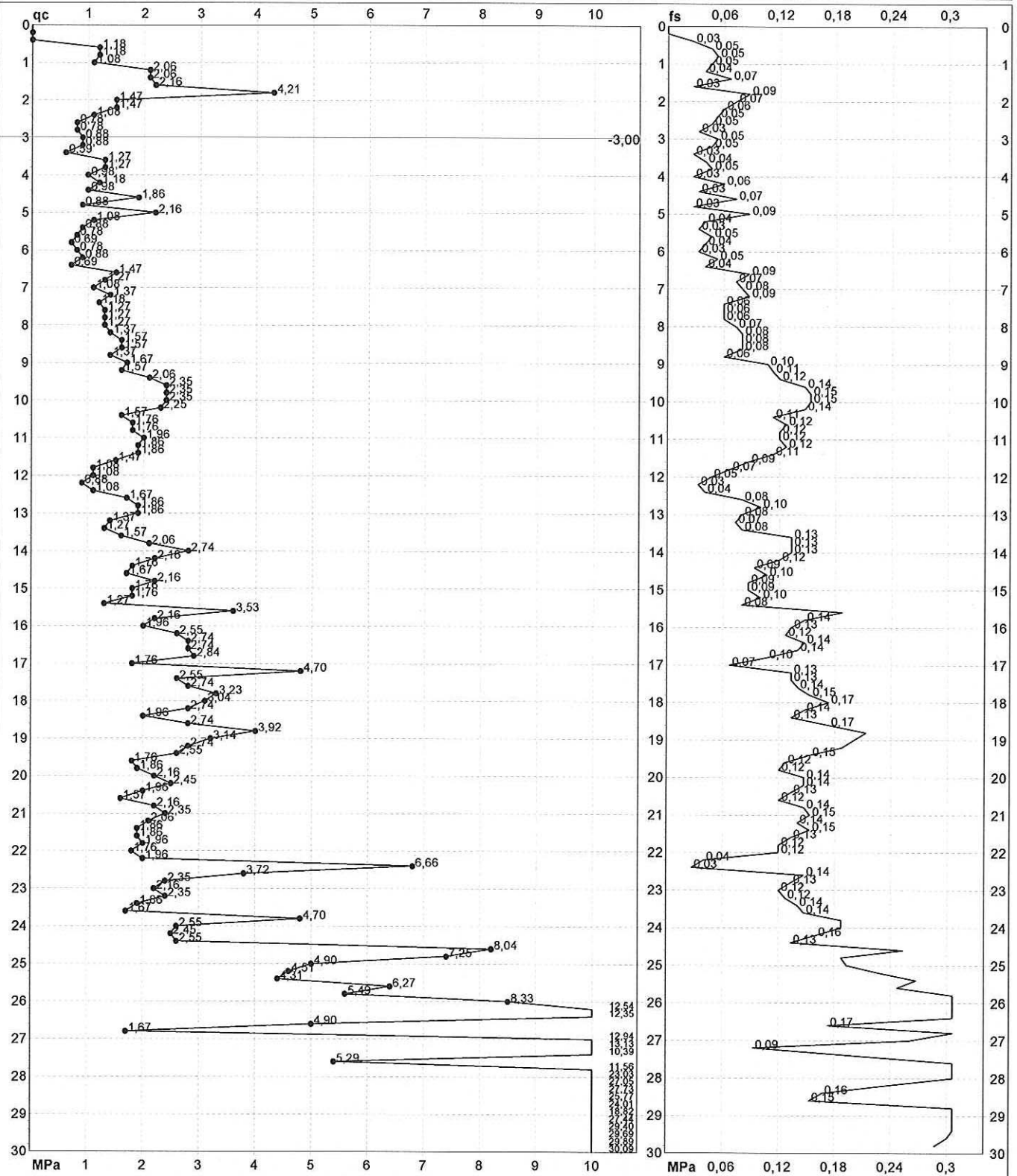
# PROVA PENETROMETRICA STATICA MECCANICA

## DIAGRAMMI DI RESISTENZA

n°	<b>1</b>
riferimento	034-08
certificato n°	4445

Committente: **Studio Tecnico**  
Cantiere: **Studio del terreno di fondazione**  
Località: **Medolla - via San Matteo**

U.M.: **MPa**      Data exec.: **12/03/2008**  
Scala: **1:150**      Data certificato: **12/03/2008**  
Pagina: **2/4**      Preforo: **m**  
Elaborato:      Falda: **-3,00 m da quota 0.00**



Coord. Relative	Coord. Geografiche	Penetrometro: <b>GOUDA 200 kN</b>	Quota ass.:
Xr:            m	Xg:	Responsabile:	Corr.astine: <b>kN/ml</b>
Yr:            m	Yg:	Assistente:	
Zr:            m	Zg:		







**PROVA PENETROMETRICA STATICA MECCANICA**  
**LETTURE CAMPAGNA: PUNTA, LATERALE, TOTALE**

n°	<b>2</b>
riferimento	034-08
certificato n°	4446

Committente: <b>Studio Tecnico</b>	U.M.: <b>MPa</b>	Data exec.: 11/03/2008
Cantiere: <b>Studio del terreno di fondazione</b>	Pagina: <b>1/4</b>	Data certificato: 12/03/2008
Località: <b>Medolla - via San Matteo</b>	Elaborato:	Preforo: m
		Falda: -2,30 m da quota 0.00

H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %	H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %
0,20	0,00	0,00		0,00	0,00										
0,40	0,00	0,00		0,00	65,66	0									
0,60	14,00	24,00		1,37	71,54	19	5,2								
0,80	19,00	30,00		1,86	78,40	24	4,2								
1,00	12,00	24,00		1,18	58,80	20	5,0								
1,20	9,00	18,00		0,88	32,34	27	3,7								
1,40	12,00	17,00		1,18	46,06	26	3,9								
1,60	8,00	15,00		0,78	19,60	40	2,5								
1,80	10,00	13,00		0,98	26,46	37	2,7								
2,00	13,00	17,00		1,27	39,20	33	3,1								
2,20	11,00	17,00		1,08	32,34	33	3,0								
2,40	21,00	26,00		2,06	19,60	105	1,0								
2,60	23,00	26,00		2,25	39,20	58	1,7								
2,80	13,00	19,00		1,27	51,94	25	4,1								
3,00	8,00	16,00		0,78	26,46	30	3,4								
3,20	10,00	14,00		0,98	46,06	21	4,7								
3,40	7,00	14,00		0,69	26,46	26	3,9								
3,60	10,00	14,00		0,98	39,20	25	4,0								
3,80	9,00	15,00		0,88	51,94	17	5,9								
4,00	10,00	18,00		0,98	65,66	15	6,7								
4,20	8,00	18,00		0,78	46,06	17	5,9								
4,40	10,00	17,00		0,98	51,94	19	5,3								
4,60	9,00	17,00		0,88	58,80	15	6,7								
4,80	10,00	19,00		0,98	32,34	30	3,3								
5,00	10,00	15,00		0,98	65,66	15	6,7								
5,20	19,00	29,00		1,86	39,20	48	2,1								
5,40	52,00	58,00		5,10	58,80	87	1,2								
5,60	53,00	62,00		5,19	202,86	26	3,9								
5,80	17,00	48,00		1,67	46,06	36	2,8								
6,00	32,00	39,00		3,14	65,66	48	2,1								
6,20	12,00	22,00		1,18	51,94	23	4,4								
6,40	10,00	18,00		0,98	58,80	17	6,0								
6,60	12,00	21,00		1,18	71,54	16	6,1								
6,80	11,00	22,00		1,08	65,66	16	6,1								
7,00	12,00	22,00		1,18	65,66	18	5,6								
7,20	11,00	21,00		1,08	71,54	15	6,6								
7,40	11,00	22,00		1,08	58,80	18	5,5								
7,60	11,00	20,00		1,08	58,80	18	5,5								
7,80	10,00	19,00		0,98	58,80	17	6,0								
8,00	12,00	21,00		1,18	78,40	15	6,7								
8,20	12,00	24,00		1,18	104,86	11	8,9								
8,40	16,00	32,00		1,57	104,86	15	6,7								
8,60	18,00	34,00		1,76	117,60	15	6,7								
8,80	18,00	36,00		1,76	183,26	10	10,4								
9,00	8,00	36,00		0,78	124,46	6	15,9								
9,20	19,00	38,00		1,86	124,46	15	6,7								
9,40	17,00	36,00		1,67	117,60	14	7,1								
9,60	16,00	34,00		1,57	104,86	15	6,7								
9,80	18,00	34,00		1,76	117,60	15	6,7								
10,00	20,00	38,00		1,96	124,46	16	6,4								
10,20	19,00	38,00		1,86	117,60	16	6,3								
10,40	18,00	36,00		1,76	110,74	16	6,3								
10,60	17,00	34,00		1,67	104,86	16	6,3								
10,80	16,00	32,00		1,57	98,00	16	6,3								
11,00	15,00	30,00		1,47	98,00	15	6,7								
11,20	18,00	33,00		1,76	104,86	17	5,9								
11,40	18,00	34,00		1,76	124,46	14	7,1								
11,60	21,00	40,00		2,06	130,34	16	6,3								
11,80	20,00	40,00		1,96	110,74	18	5,7								
12,00	13,00	30,00		1,27	98,00	13	7,7								
12,20	11,00	26,00		1,08	65,66	16	6,1								
12,40	8,00	18,00		0,78	65,66	12	8,4								
12,60	8,00	18,00		0,78	51,94	15	6,6								
12,80	9,00	17,00		0,88	65,66	13	7,4								
13,00	16,00	26,00		1,57	78,40	20	5,0								
13,20	14,00	26,00		1,37	78,40	18	5,7								
13,40	14,00	26,00		1,37	104,86	13	7,6								
13,60	20,00	36,00		1,96	156,80	13	8,0								
13,80	28,00	52,00		2,74	208,74	13	7,6								
14,00	32,00	64,00		3,14	208,74	15	6,7								
14,20	50,00	82,00		4,90	261,66	19	5,3								
14,40	51,00	91,00		5,00	333,20	15	6,7								
14,60	37,00	88,00		3,63	235,20	15	6,5								
14,80	20,00	56,00		1,96	196,00	10	10,0								
15,00	18,00	48,00		1,76											

H = profondità  
L1 = prima lettura (punta)  
L2 = seconda lettura (punta + laterale)  
Lt = terza lettura (totale)

qc = resistenza di punta  
fs = resistenza laterale calcolata  
0.20 m sopra quota di qc  
F = rapporto di Begemann (qc / fs)  
Fr = rapporto di Schmertmann (fs / qc)%



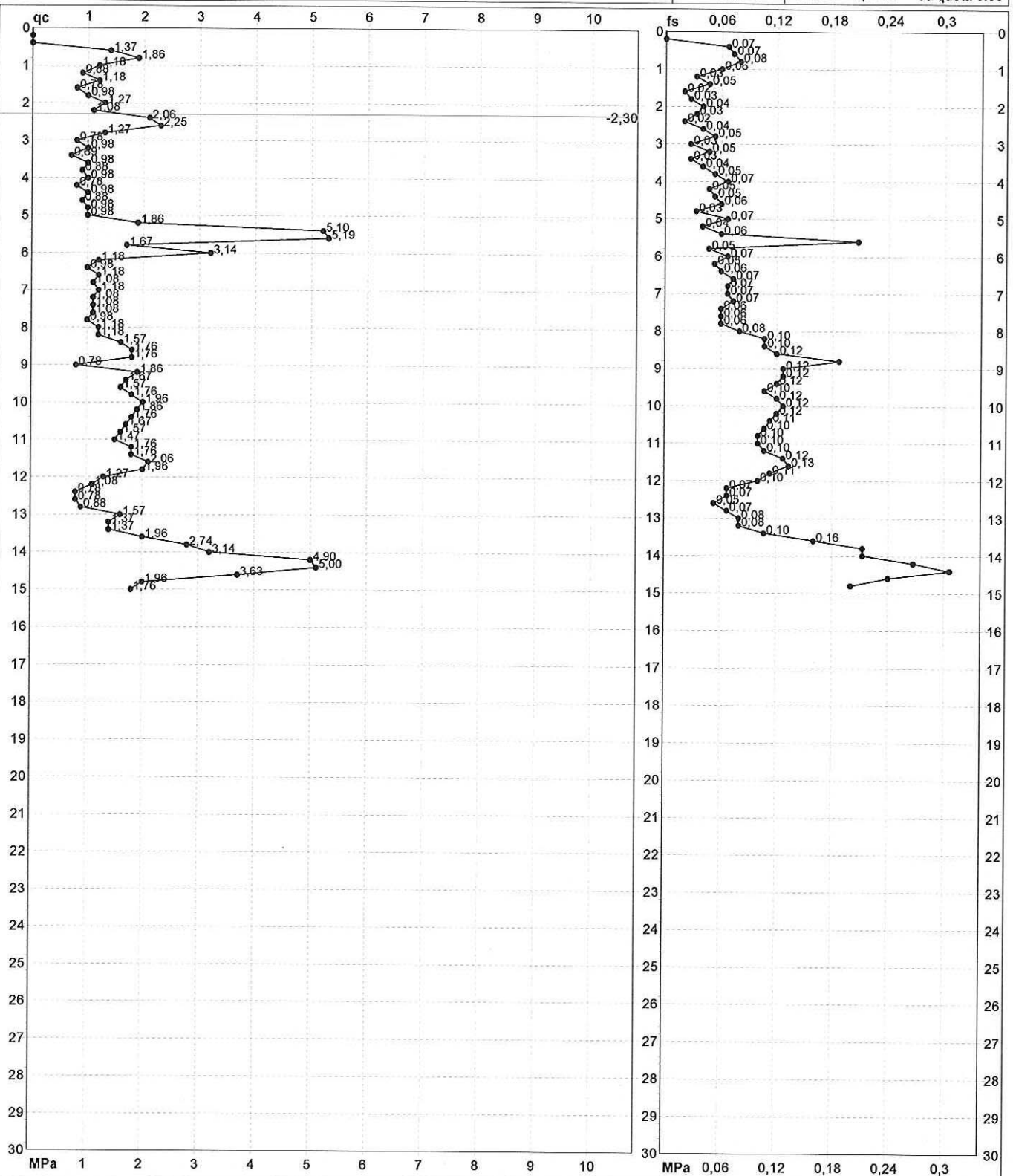
# PROVA PENETROMETRICA STATICA MECCANICA

## DIAGRAMMI DI RESISTENZA

n°	<b>2</b>
riferimento	034-08
certificato n°	4446

Committente: **Studio Tecnico**  
Cantiere: **Studio del terreno di fondazione**  
Località: **Medolla - via San Matteo**

U.M.: **MPa**      Data esec.: **11/03/2008**  
Scala: **1:150**      Data certificato: **12/03/2008**  
Pagina: **2/4**      Preforo: **m**  
Elaborato:      Falda: **-2,30 m** da quota **0.00**



Coord. Relative Xr: 0,00 m Yr: 0,00 m Zr: m	Coord. Geografiche Xg: Yg: Zg:	Penetrometro: GOUDA 200 kN Responsabile: Assistente:	Quota ass.: Corr.astine: kN/ml
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**PROVA PENETROMETRICA STATICA MECCANICA**  
**LETTURE CAMPAGNA: PUNTA, LATERALE, TOTALE**

n°	<b>3</b>
riferimento	034-08
certificato n°	4447

Committente: <b>Studio Tecnico</b>	U.M.: <b>MPa</b>	Data exec.: 11/03/2008
Cantiere: <b>Studio del terreno di fondazione</b>	Pagina: <b>1/4</b>	Data certificato: 12/03/2008
Località: <b>Medolla - via San Matteo</b>	Elaborato:	Preforo: m
		Falda: -2,30 m da quota 0.00

H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %	H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %
0,20	0,00	0,00		0,00	0,00										
0,40	0,00	0,00		0,00	51,94	0									
0,60	5,00	13,00		0,49	65,66	7	13,4								
0,80	10,00	20,00		0,98	46,06	21	4,7								
1,00	11,00	18,00		1,08	46,06	23	4,3								
1,20	20,00	27,00		1,96	26,46	74	1,4								
1,40	19,00	23,00		1,86	32,34	58	1,7								
1,60	19,00	24,00		1,86	46,06	40	2,5								
1,80	11,00	18,00		1,08	65,66	16	6,1								
2,00	26,00	36,00		2,55	58,80	43	2,3								
2,20	15,00	24,00		1,47	78,40	19	5,3								
2,40	11,00	23,00		1,08	58,80	18	5,5								
2,60	10,00	19,00		0,98	51,94	19	5,3								
2,80	7,00	15,00		0,69	46,06	15	6,7								
3,00	4,00	11,00		0,39	32,34	12	8,3								
3,20	8,00	13,00		0,78	39,20	20	5,0								
3,40	6,00	12,00		0,59	32,34	18	5,5								
3,60	14,00	19,00		1,37	26,46	52	1,9								
3,80	10,00	14,00		0,98	85,26	11	8,7								
4,00	14,00	27,00		1,37	65,66	21	4,8								
4,20	7,00	17,00		0,69	71,54	10	10,4								
4,40	17,00	28,00		1,67	46,06	36	2,8								
4,60	30,00	37,00		2,94	71,54	41	2,4								
4,80	32,00	43,00		3,14	19,60	160	0,6								
5,00	16,00	19,00		1,57	32,34	48	2,1								
5,20	15,00	20,00		1,47	51,94	28	3,5								
5,40	14,00	22,00		1,37	78,40	18	5,7								
5,60	28,00	40,00		2,74	26,46	104	1,0								
5,80	19,00	23,00		1,86	78,40	24	4,2								
6,00	11,00	23,00		1,08	71,54	15	6,6								
6,20	8,00	19,00		0,78	46,06	17	5,9								
6,40	13,00	20,00		1,27	65,66	19	5,2								
6,60	12,00	22,00		1,18	71,54	16	6,1								
6,80	9,00	20,00		0,88	51,94	17	5,9								
7,00	11,00	19,00		1,08	58,80	18	5,5								
7,20	10,00	19,00		0,98	65,66	15	6,7								
7,40	10,00	20,00		0,98	58,80	17	6,0								
7,60	15,00	24,00		1,47	130,34	11	8,9								
7,80	10,00	30,00		0,98	58,80	17	6,0								
8,00	25,00	34,00		2,45	58,80	42	2,4								
8,20	11,00	20,00		1,08	51,94	21	4,8								
8,40	13,00	21,00		1,27	65,66	19	5,2								
8,60	17,00	27,00		1,67	91,14	18	5,5								
8,80	16,00	30,00		1,57	98,00	16	6,3								
9,00	17,00	32,00		1,67	98,00	17	5,9								
9,20	15,00	30,00		1,47	110,74	13	7,5								
9,40	19,00	36,00		1,86	124,46	15	6,7								
9,60	21,00	40,00		2,06	130,34	16	6,3								
9,80	22,00	42,00		2,16	130,34	17	6,0								
10,00	19,00	39,00		1,86	110,74	17	5,9								
10,20	17,00	34,00		1,67	98,00	17	5,9								
10,40	19,00	34,00		1,86	110,74	17	5,9								
10,60	19,00	36,00		1,86	117,60	16	6,3								
10,80	22,00	40,00		2,16	117,60	18	5,5								
11,00	22,00	40,00		2,16	124,46	17	5,8								
11,20	11,00	30,00		1,08	78,40	14	7,3								
11,40	15,00	27,00		1,47	51,94	28	3,5								
11,60	13,00	21,00		1,27	51,94	25	4,1								
11,80	9,00	17,00		0,88	51,94	17	5,9								
12,00	11,00	19,00		1,08	65,66	16	6,1								
12,20	11,00	21,00		1,08	58,80	18	5,5								
12,40	10,00	19,00		0,98	46,06	21	4,7								
12,60	10,00	17,00		0,98	46,06	21	4,7								
12,80	10,00	17,00		0,98	51,94	19	5,3								
13,00	10,00	18,00		0,98	65,66	15	6,7								
13,20	13,00	23,00		1,27	98,00	13	7,7								
13,40	19,00	34,00		1,86	110,74	17	5,9								
13,60	25,00	42,00		2,45	144,06	17	5,9								
13,80	22,00	44,00		2,16	104,86	21	4,9								
14,00	16,00	32,00		1,57	91,14	17	5,8								
14,20	12,00	26,00		1,18	78,40	15	6,7								
14,40	20,00	32,00		1,96	104,86	19	5,4								
14,60	20,00	36,00		1,96	104,86	19	5,4								
14,80	20,00	36,00		1,96	91,14	22	4,7								
15,00	26,00	40,00		2,55											

H = profondità  
L1 = prima lettura (punta)  
L2 = seconda lettura (punta + laterale)  
Lt = terza lettura (totale)  
qc = resistenza di punta  
fs = resistenza laterale calcolata  
0.20 m sopra quota di qc  
F = rapporto di Begemann (qc / fs)  
Fr = rapporto di Schmertmann (fs / qc)%



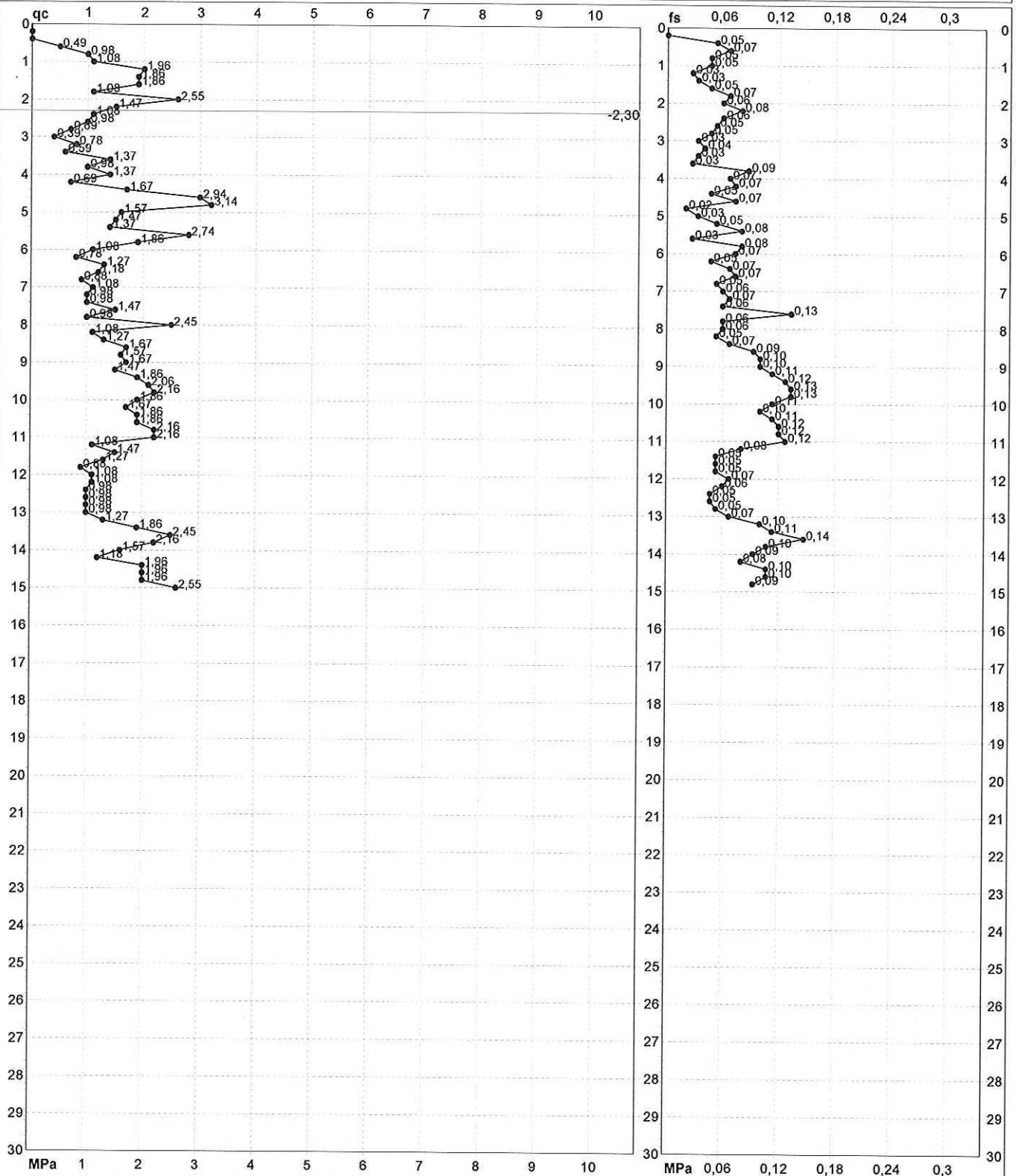
# PROVA PENETROMETRICA STATICA MECCANICA

## DIAGRAMMI DI RESISTENZA

n°	<b>3</b>
riferimento	034-08
certificato n°	4447

Committente: **Studio Tecnico**  
 Cantiere: **Studio del terreno di fondazione**  
 Località: **Medolla - via San Matteo**

U.M.: **MPa**      Data exec.: **11/03/2008**  
 Scala: **1:150**      Data certificato: **12/03/2008**  
 Pagina: **2/4**      Preforo: **m**  
 Elaborato:      Falda: **-2,30 m da quota 0.00**



Coord. Relative	Coord. Geografiche	Penetrometro: GOUDA 200 kN	Quota ass.:
Xr: m	Xg:	Responsabile:	Corr.astine: kN/ml
Yr: m	Yg:	Assistente:	
Zr: m	Zg:		





**PROVA PENETROMETRICA STATICA MECCANICA**  
**LETTURE CAMPAGNA: PUNTA, LATERALE, TOTALE**

n°	<b>4</b>
riferimento	034-08
certificato n°	4448

Committente: <b>Studio Tecnico</b>	U.M.: <b>MPa</b>	Data esec.: 11/03/2008
Cantiere: <b>Studio del terreno di fondazione</b>	Pagina: <b>1/4</b>	Data certificato: 12/03/2008
Località: <b>Medolla - via San Matteo</b>	Elaborato:	Preforo: m
		Falda: -2,80 m da quota 0.00

H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %	H m	L1 -	L2 -	Lt -	qc MPa	fs kPa	F -	Fr %
0,20	0,00	0,00		0,00	0,00										
0,40	0,00	0,00		0,00	39,20	0									
0,60	11,00	17,00		1,08	51,94	21	4,8								
0,80	7,00	15,00		0,69	46,06	15	6,7								
1,00	8,00	15,00		0,78	32,34	24	4,1								
1,20	12,00	17,00		1,18	51,94	23	4,4								
1,40	26,00	34,00		2,55	39,20	65	1,5								
1,60	22,00	28,00		2,16	46,06	47	2,1								
1,80	34,00	41,00		3,33	39,20	85	1,2								
2,00	14,00	20,00		1,37	58,80	23	4,3								
2,20	9,00	18,00		0,88	39,20	23	4,4								
2,40	9,00	15,00		0,88	51,94	17	5,9								
2,60	9,00	17,00		0,88	46,06	19	5,2								
2,80	8,00	15,00		0,78	39,20	20	5,0								
3,00	8,00	14,00		0,78	39,20	20	5,0								
3,20	10,00	16,00		0,98	46,06	21	4,7								
3,40	10,00	17,00		0,98	58,80	17	6,0								
3,60	8,00	17,00		0,78	58,80	13	7,5								
3,80	7,00	16,00		0,69	39,20	18	5,7								
4,00	8,00	14,00		0,78	39,20	20	5,0								
4,20	6,00	12,00		0,59	32,34	18	5,5								
4,40	12,00	17,00		1,18	71,54	16	6,1								
4,60	8,00	19,00		0,78	71,54	11	9,1								
4,80	18,00	29,00		1,76	71,54	25	4,1								
5,00	37,00	48,00		3,63	32,34	112	0,9								
5,20	40,00	45,00		3,92	39,20	100	1,0								
5,40	30,00	36,00		2,94	104,86	28	3,6								
5,60	22,00	38,00		2,16	65,66	33	3,0								
5,80	8,00	18,00		0,78	58,80	13	7,5								
6,00	8,00	17,00		0,78	46,06	17	5,9								
6,20	11,00	18,00		1,08	71,54	15	6,6								
6,40	10,00	21,00		0,98	58,80	17	6,0								
6,60	12,00	21,00		1,18	71,54	16	6,1								
6,80	11,00	22,00		1,08	71,54	15	6,6								
7,00	10,00	21,00		0,98	65,66	15	6,7								
7,20	10,00	20,00		0,98	65,66	15	6,7								
7,40	9,00	19,00		0,88	51,94	17	5,9								
7,60	8,00	16,00		0,78	65,66	12	8,4								
7,80	6,00	16,00		0,59	39,20	15	6,7								
8,00	7,00	13,00		0,69	39,20	18	5,7								
8,20	6,00	12,00		0,59	39,20	15	6,7								
8,40	13,00	19,00		1,27	85,26	15	6,7								
8,60	15,00	28,00		1,47	91,14	16	6,2								
8,80	15,00	29,00		1,47	98,00	15	6,7								
9,00	17,00	32,00		1,67	98,00	17	5,9								
9,20	16,00	31,00		1,57	98,00	16	6,3								
9,40	17,00	32,00		1,67	124,46	13	7,5								
9,60	18,00	37,00		1,76	124,46	14	7,1								
9,80	20,00	39,00		1,96	130,34	15	6,7								
10,00	20,00	40,00		1,96	144,06	14	7,4								
10,20	19,00	41,00		1,86	124,46	15	6,7								
10,40	19,00	38,00		1,86	130,34	14	7,0								
10,60	22,00	42,00		2,16	130,34	17	6,0								
10,80	22,00	42,00		2,16	130,34	17	6,0								
11,00	18,00	38,00		1,76	117,60	15	6,7								
11,20	18,00	36,00		1,76	124,46	14	7,1								
11,40	19,00	38,00		1,86	130,34	14	7,0								
11,60	22,00	42,00		2,16	130,34	17	6,0								
11,80	16,00	36,00		1,57	104,86	15	6,7								
12,00	14,00	30,00		1,37	65,66	21	4,8								
12,20	16,00	26,00		1,57	58,80	27	3,8								
12,40	8,00	17,00		0,78	51,94	15	6,6								
12,60	12,00	20,00		1,18	110,74	11	9,4								
12,80	17,00	34,00		1,67	144,06	12	8,6								
13,00	20,00	42,00		1,96	124,46	16	6,4								
13,20	19,00	38,00		1,86	98,00	19	5,3								
13,40	19,00	34,00		1,86	98,00	19	5,3								
13,60	19,00	34,00		1,86	130,34	14	7,0								
13,80	22,00	42,00		2,16	130,34	17	6,0								
14,00	27,00	47,00		2,65	189,14	14	7,1								
14,20	31,00	60,00		3,04	169,54	18	5,6								
14,40	38,00	64,00		3,72	149,94	25	4,0								
14,60	31,00	54,00		3,04	156,80	19	5,2								
14,80	39,00	63,00		3,82	163,66	23	4,3								
15,00	38,00	63,00		3,72											

H = profondità  
L1 = prima lettura (punta)  
L2 = seconda lettura (punta + laterale)  
Lt = terza lettura (totale)  
qc = resistenza di punta  
fs = resistenza laterale calcolata  
0.20 m sopra quota di qc  
F = rapporto di Begemann (qc / fs)  
Fr = rapporto di Schmertmann (fs / qc)%



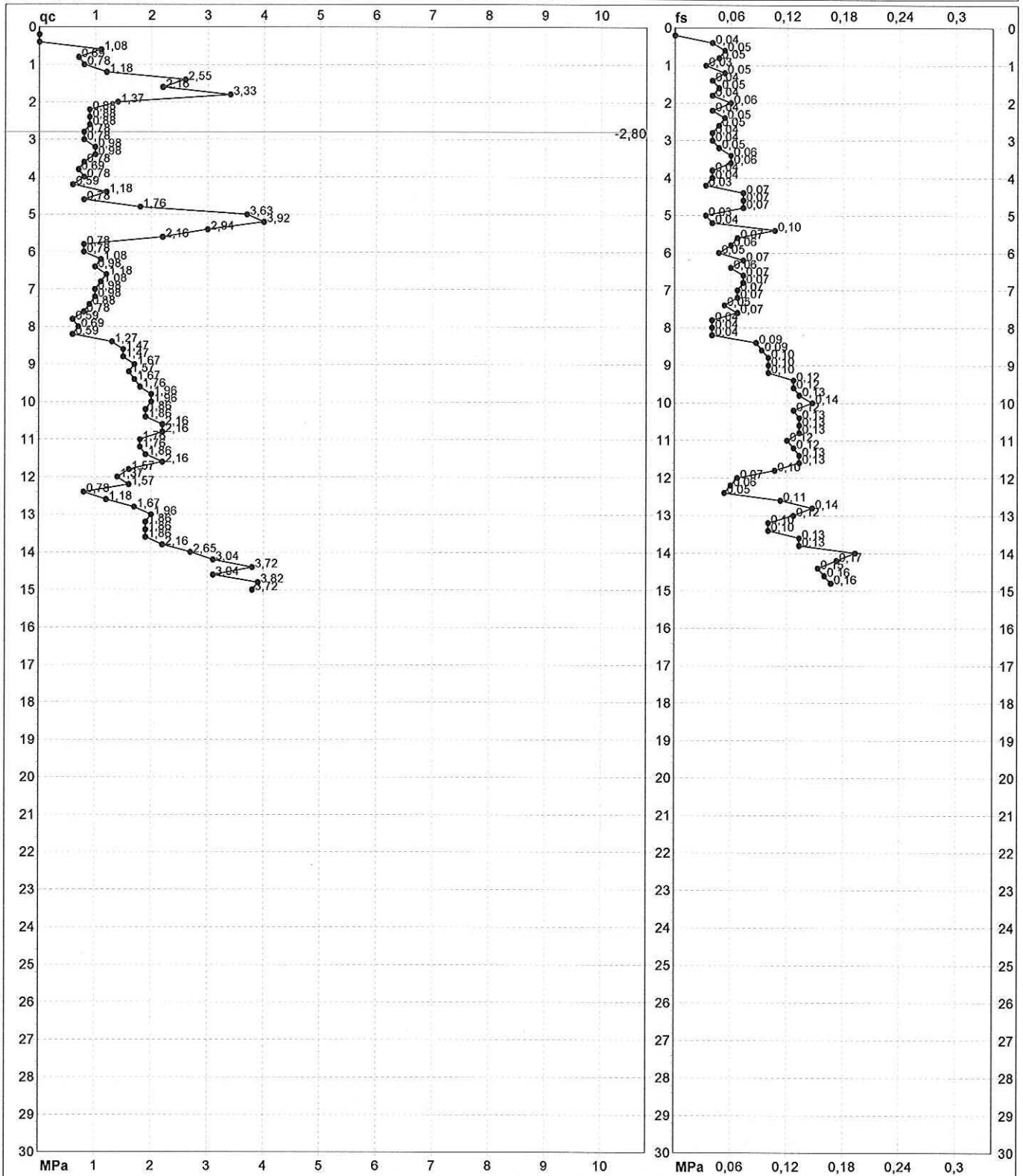
# PROVA PENETROMETRICA STATICA MECCANICA

## DIAGRAMMI DI RESISTENZA

n°	<b>4</b>
riferimento	034-08
certificato n°	4448

Committente: **Studio Tecnico**  
 Cantiere: **Studio del terreno di fondazione**  
 Località: **Medolla - via San Matteo**

U.M.: **MPa**      Data eseg.: **11/03/2008**  
 Scala: **1:150**      Data certificato: **12/03/2008**  
 Pagina: **2/4**      Preforo: **m**  
 Elaborato:      Falda: **-2,80 m** da quota **0.00**



<b>Coord. Relative</b>	<b>Coord. Geografiche</b>	<b>Penetrometro: GOUDA 200 kN</b>	<b>Quota ass.:</b>
Xr: m	Xg:	Responsabile:	Corr.astine: kN/ml
Yr: m	Yg:	Assistente:	
Zr: m	Zg:		



# **ALLEGATO 2**

*Indagini geofisiche MASW-HS, HVSR, Re.Mi.*

# CARATTERISTICHE DELLA STRUMENTAZIONE PER L'ACQUISIZIONE GEOFISICA

## Descrizione

Gemini è un acquirente di dati sismici.

All'interno di un unico contenitore waterproof è integrata una terna di geofoni e un acquirente hardware da 24 bit, le masse oscillanti con frequenza di risonanza da 2Hz sono accuratamente accoppiate meccanicamente ed elettricamente.

Gemini permette di acquisire ed effettuare indagini di:

- Sismica passiva
  - dati HVSR, quindi di sismica cosiddetta "passiva";
  - misure vibrazionali.
- Sismica attiva
  - rilievi MASW;
  - dati Holisurface.

Collegata a computer tramite l'interfaccia USB, la Gemini consente la memorizzazione e la successiva analisi dei dati direttamente su PC tramite il software dedicato in dotazione. I tre geofoni interni sono orientati secondo una terna di assi cartesiani, assumendo la convenzione descritta nelle linee guida del Progetto "SESAME":

- asse Z = geofono verticale = direzione Up-Down;
- asse X = geofono orizzontale = direzione East-West;
- asse Y = geofono orizzontale = direzione North-South.

L'etichetta sul contenitore di Gemini riporta le informazioni per il corretto orientamento; ricordiamo inoltre che la terna deve essere livellata prima dell'acquisizione, operazione facilitata con l'ausilio della livella a bolla montata sul corpo dello strumento. Le operazioni di livellamento su pavimentazioni rigide sono possibili montando sulla terna gli appositi piedini regolabili in dotazione; per l'utilizzo su terreno, si consiglia l'utilizzo con gli appositi puntali.

## Caratteristiche tecniche nominali della terna di geofoni Gemini-2 (temp.di rif.=20°C)

Frequenza Naturale: 2Hz  $\pm$  10%

Sensibilità: 2V/cm\*s-1  $\pm$  10%

Resistenza interna: 5.8 K $\Omega$  $\pm$ 5%

Smorzamento (dumping): 0.7 $\pm$ 10%

Distorsione armonica:  $\leq$  0.2%

Impedenza di ingresso:  $\geq$  10M $\Omega$

Temperatura d'utilizzo: -25°C  $\sim$  +55°C

Dimensioni:  $\varnothing$  128 x 80mm (piedini escl.)

Peso: 2.10 kg

### **VERSIONE “GEMINI HVSR”**

- n.1 geofono triassiale Gemini da 2 Hz;
- n°3 puntali per terreno;
- n°3 piedini regolabili (per utilizzo su asfalto o supporti/materiali rigidi);
- n.1 cavo USB per connessione a PC;
- n.1 chiave USB con manuale, software di gestione e documentazione tecnica.

### **VERSIONE “GEMINI MASW”**

- n.1 geofono triassiale Gemini da 2 Hz;
- n°3 puntali per terreno;
- n°3 piedini regolabili (per utilizzo su asfalto o supporti/materiali rigidi);
- n.1 cavo USB per connessione a PC dotato di connessione per trigger (geofono starter o mazza di battura);
- n.1 cavo schermato su rullo (Mt. 100) per trigger Gemini;
- n.1 Geofono starter;
- n.1 Mazza di battuta da 8Kg, con starter piezoelettrico;
- n.1 Piattello di battuta in alluminio per energizzazione verticale, dimensioni 20x20x5 cm;
- n.1 Traversina in legno per energizzazione laterale;
- n.1 Chiave USB-GPS per geo-localizzazione;
- n.1 Chiave USB con manuale, software di gestione e documentazione tecnica.

### **SOFTWARE DI ACQUISIZIONE DATI: *PASI GEMINI - Versione 3.2.4***

#### **Specifiche tecniche del software e dell’elettronica di campionamento**

Impedenza d’ingresso: 2 M $\Omega$

Frequenze di campionamento: 20, 100, 200, 500, 1000, 2000, 4000, Hz

Risoluzione della conversione A/D: 24 bit reali

Durata delle acquisizioni: da 250 ms a 1440 minuti

Numero di canali acquisiti: 3 + 1 AUX (eventuale trigger)

Dinamica massima teorica: 144 dB

Rev. 2.2.7 16

Rapporto S/N a Fc=1KHz: 117 dB

Banda passante a Fc=1KHz: 110 Hz, proporzionale a Fc

Temperatura d’utilizzo: -25°C ~□+55°C

### **SOFTWARE DI ELABORAZIONE DATI:**

#### ***WinMASW 3C - Versione 2018***

#### ***HoliSurface - Versione 2018***

Per maggiori dettagli, si prega di consultare l’indirizzo Internet:

<http://www.winmasw.com>



Figura A. 1 - Versione "GEMINI HVSr" basilare impiegata per la prospezione sismica passiva: dettaglio dei supporti intercambiabili in dotazione, da sostituire a seconda che si acquisisca su superficie rigida o su terreno.



Figura A. 2 - Versione "GEMINI MASW" impiegata per la prospezione sismica attiva: lo stendimento prevede il collegamento della strumentazione procedendo da sinistra verso destra. In aggiunta va inserito il PC come per una normale acquisizione HVSr.

## LOCALIZZAZIONE INDAGINI GEOFISICHE

LOCALITA': Via Romana, Medolla  
COMUNE: Medolla (MO)  
DATA ACQUISIZIONE: 06 07 2020  
ORA: 12.10



### Subsurface model

Vs (m/s): 50 120 155 120 165 200 205 275 400 450 760

Thickness (m): 0.3 0.3 1.2 2.0 2.5 7.2 6.5 13.0 46.0 54.0

Density (gr/cm<sup>3</sup>): 1.50 1.65 1.73 2.16 1.73 1.95 1.84 1.85 1.94 2.06 2.10

Seismic/Dynamic Shear modulus (MPa) (approx. values): 4 24 41 31 47 78 77 140 310 416 1210

Poisson: 0.33 0.16 0.22 0.50 0.15 0.45 0.33 0.15 0.15 0.37 0.15

**Vs, eq = Vs30 (m/s): 197**

### CATEGORIA C

C - Depositi di terreni a grana grossa mediamente addensati o terreni a grana fina mediamente consistenti con profondità del substrato superiori a 30 m, caratterizzati da un miglioramento delle proprietà meccaniche con la profondità e da valori di velocità equivalente compresi tra 180 m/s e 360 m/s.

**Picchi di interesse ingegneristico fra 0,5-20 Hz:**

**F1 → 0,5-1,0 Hz**

## ACQUISIZIONE MASW - HS



Figura A. 3 - Stendimento sismico MASW-HS realizzato in corrispondenza dell'area di studio.

## ACQUISIZIONE HVSR1



Figura A. 4 - Acquisizione HVSR1 realizzata in corrispondenza dell'area di studio.

## ACQUISIZIONE MASW

Tabella A - Dati riassuntivi relativi all'acquisizione in sismica attiva

DATI RIASSUNTIVI - ACQUISIZIONE IN SISMICA ATTIVA M.A.S.W.	
<b>Operatore in campagna</b>	Dott. Geol. Gabriele Oppo
<b>Lunghezza Stendimento</b>	64 metri
<b>Offset Minimo</b>	8 metri
<b>Incremento</b>	8 metri
<b>N° tracce</b>	8
<b>Tipo di Onda</b>	Rayleigh: n.1 battute Forza Verticale: - battuta su piattello in alluminio
	Love: n.3 battute Forza Trasversale: - battuta di taglio su traversina in legno
<b>Lunghezza dell'acquisizione</b>	2 secondi
<b>Intervallo di Campionamento</b>	0.001 secondi
<b>Stacking</b>	4 battute per punto sorgente: 1 Verticali + 3 Orizzontali

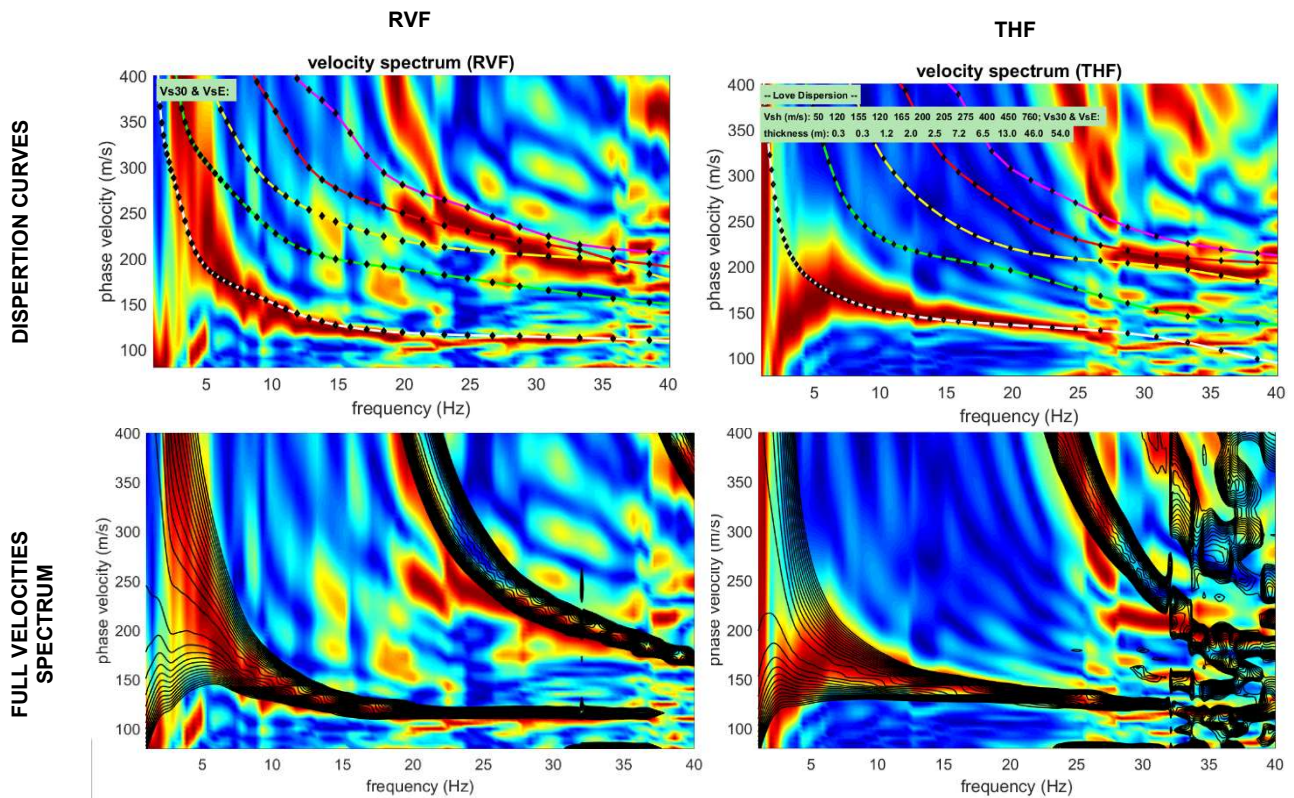
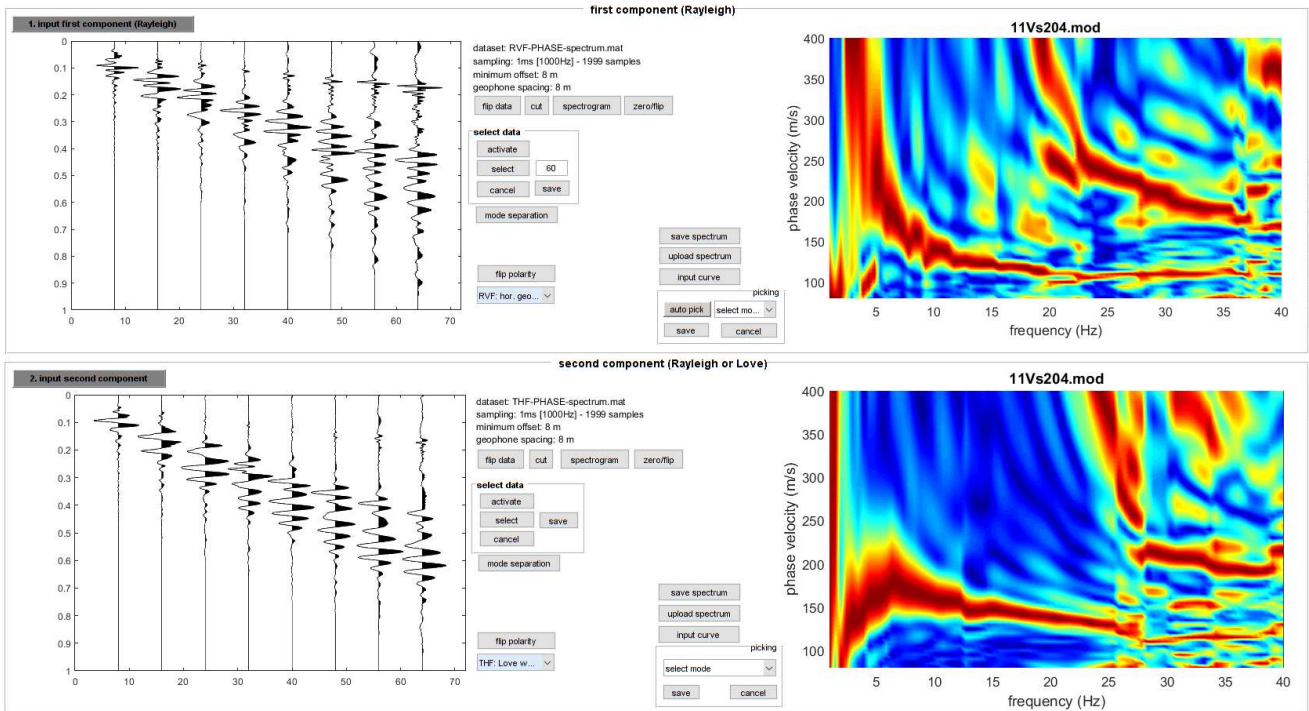
## ACQUISIZIONE HS

Tabella B - Dati riassuntivi relativi all'acquisizione in sismica attiva

DATI RIASSUNTIVI - ACQUISIZIONE IN SISMICA ATTIVA H.S.	
<b>Operatore in campagna</b>	Dott. Geol. Gabriele Oppo
<b>Lunghezza Stendimento</b>	64 metri
<b>Offset Minimo</b>	- metri
<b>Incremento</b>	- metri
<b>N° tracce</b>	1
<b>Tipo di Onda</b>	Rayleigh: n.1 battute Forza Verticale: - battuta su piattello in alluminio
	Love: n.3 battute Forza Trasversale: - battuta di taglio su traversina in legno
<b>Lunghezza dell'acquisizione</b>	2 secondi
<b>Intervallo di Campionamento</b>	0.001 secondi
<b>Stacking</b>	4 battute per punto sorgente: 1 Verticali + 3 Orizzontali

## ACQUISIZIONE MASW

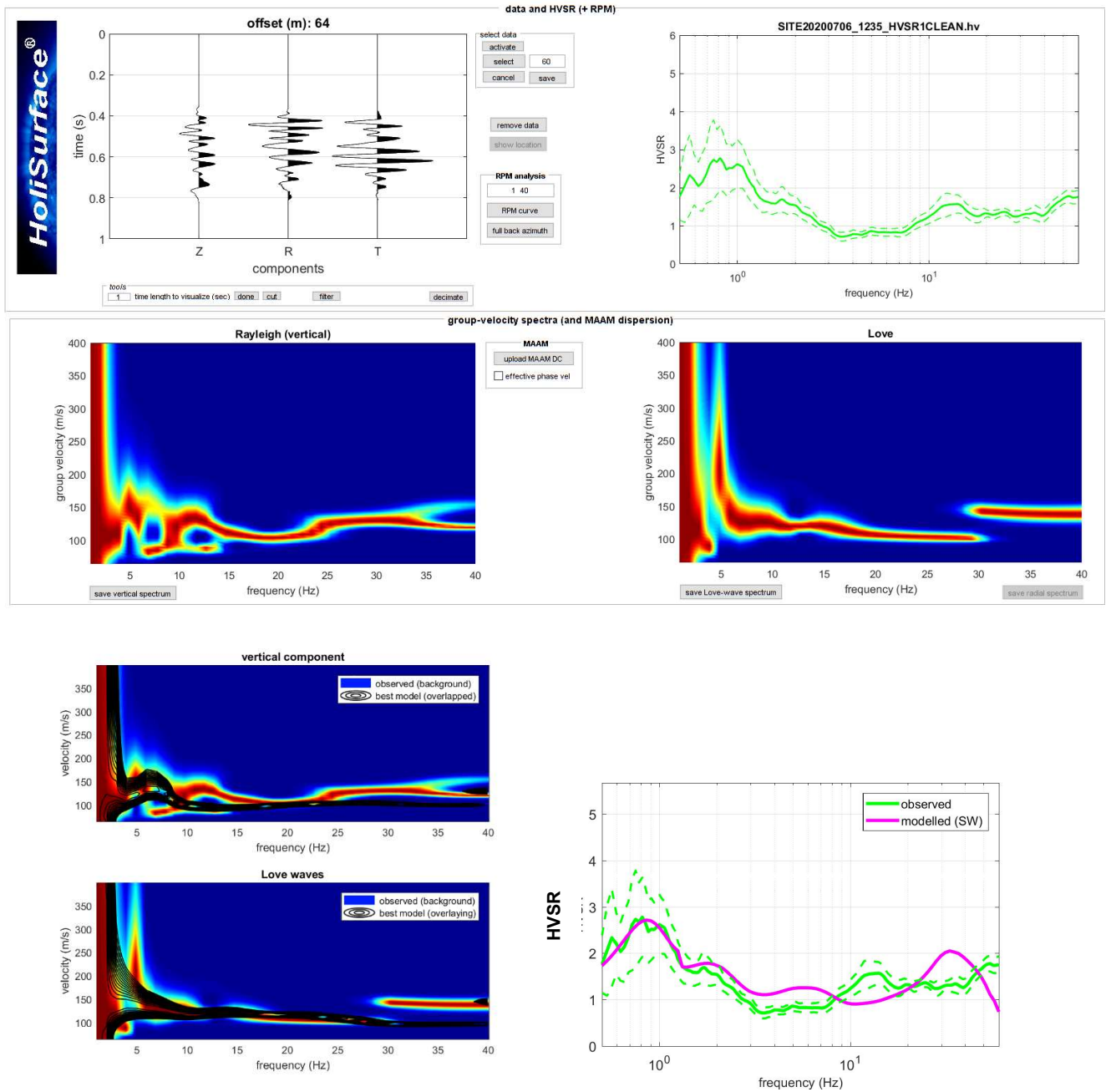
### Joint Analysis of Rayleigh-Love Wave Dispersion in average RVF-THF & HVSR



I colori in sottofondo sono relativi agli spettri di velocità dei dati di campagna, le linee colorate in primo piano rappresentano le curve di dispersione del modello elaborato mentre le curve di contour nere si riferiscono al dato sintetico.

## ACQUISIZIONE HS

### Joint Analysis of Rayleigh-Love Wave Dispersion in ZVF - THF & HVSr



Il modello elaborato risulta compatibile col dato MASW, col dato HS e con l'HVSr, a conferma di una sua attendibilità.

## ACQUISIZIONE HVSR1

<b>CLASSE DI QUALITÀ DELLA MISURA</b>	<b>A</b>	<b>B1</b>	<b>B2</b>	<b>C</b>
<b>Descrizione delle Classi</b>	CLASSE A: Prova affidabile ed interpretabile	CLASSE B1: Prova da interpretare che presenta almeno un picco chiaro	CLASSE B2: Prova da interpretare che non presenta picchi chiari nell'intervallo di frequenze considerato	CLASSE C: Prova scadente difficile da interpretare

<b>SESAME HVSR MEASUREMENT FIELD SHEET</b>			
<b>Comune: Medolla (MO)</b>		<b>Indirizzo: Via Romana, Medolla</b>	
<b>Attività da svolgere:</b> Indagine HVSR		<b>Data: 06/07/2020</b>	<b>Ora: 12.35</b>
<b>DATI TECNICI</b>			
<b>Operatore:</b> Geol. Gabriele Oppo		<b>Indagine n°</b> HVSR1	<b>Codice file</b> /
<b>Strumento:</b> Geofono triassiale da 2 Hz "GEMINI 2" <i>PASI Instruments</i>		<b>Freq. Campionamento:</b> 200 Hz	<b>Durata (min):</b> 25 min

### CONDIZIONI ATMOSFERICHE

<b>Vento</b>	<input checked="" type="checkbox"/> assente	<input type="checkbox"/> debole	<input type="checkbox"/> moderato	<input type="checkbox"/> forte
<b>Pioggia</b>	<input checked="" type="checkbox"/> assente	<input type="checkbox"/> debole	<input type="checkbox"/> moderata	<input type="checkbox"/> forte

### TERRENO DI PROVA

<b>Suolo</b>	<input checked="" type="checkbox"/> argilloso limoso soffice	<input type="checkbox"/> argilloso limoso duro	<input checked="" type="checkbox"/> con erba	<input type="checkbox"/> senza erba
	<input type="checkbox"/> ghiaia	<input type="checkbox"/> sabbia	<input type="checkbox"/> sabbia e ghiaia	<input type="checkbox"/> roccia
<b>Pavimentazione artificiale</b>	<input type="checkbox"/> rilevato in ghiaia	<input type="checkbox"/> cemento/cls	<input type="checkbox"/> asfalto	<input type="checkbox"/> sabbia
<b>Accoppiamento sensore</b>	<input checked="" type="checkbox"/> piedini infissi	<input type="checkbox"/> accoppiamento artificiale	<input type="checkbox"/> sabbia	<input type="checkbox"/> altro
	<input type="checkbox"/> piedini da pavimento			

### STRUTTURE CIRCOSTANTI

<b>Abitazioni</b>	<input type="checkbox"/> assenti	<input checked="" type="checkbox"/> sparse	<input type="checkbox"/> fitte	<input type="checkbox"/> molto fitte
<b>Fabbriche</b>	<input type="checkbox"/> assenti	<input checked="" type="checkbox"/> sparse	<input type="checkbox"/> fitte	<input type="checkbox"/> molto fitte
<b>Piante</b>	<input type="checkbox"/> assenti	<input checked="" type="checkbox"/> sparse	<input type="checkbox"/> fitte	<input type="checkbox"/> molto fitte
<b>Ponti.</b>	<input checked="" type="checkbox"/> Assenti		<input type="checkbox"/> Presenti	
<b>Strutt.sotterr.</b>	<input checked="" type="checkbox"/> Assenti		<input type="checkbox"/> Presenti	

### SORGENTI DI RUMORE

<b>Disturbo discontinuo</b>	Assente	Raro	Moderato	Forte	Molto forte	Distanza (m)
	<i>auto</i>		<input checked="" type="checkbox"/>			
	<i>mezzi pesanti</i>	<input checked="" type="checkbox"/>				
	<i>passanti</i>	<input checked="" type="checkbox"/>				
	<i>altro</i>	<input checked="" type="checkbox"/>				
<b>Disturbo continuo</b>	<input checked="" type="checkbox"/> Assenti			<input type="checkbox"/> Presenti		

## ACQUISIZIONE HVSR1

### Horizontal-to-Vertical Spectral Ratio from passive seismics

Dataset: SITE20200706\_1235\_HVSR1CLEAN.SAF

Sampling frequency (Hz): 128

Window length (sec): 20

Minimum frequency soundly determined [10 cycles]: 0.5Hz

Length of analysed dataset (min): 18.3

Tapering (%): 5

Smoothing (%): 15

=====

#### In the following the results considering the data in the 0.5-20.0Hz frequency range

Peak frequency (Hz): 0.8 (±2.0)

Peak HVSR value: 2.6 (±0.7)

#### === Criteria for a reliable H/V curve =====

- #1.  $[f_0 > 10/Lw]: 0.782 > 0.5$  (OK)
- #2.  $[nc > 200]: 1298 > 200$  (OK)
- #3.  $[f_0 > 0.5\text{Hz}; \sigma_A(f) < 2 \text{ for } 0.5f_0 < f < 2f_0]$  (OK)

#### === Criteria for a clear H/V peak (at least 5 should be fulfilled) =====

- #1.  $[\text{exists } f_- \text{ in the range } [f_0/4, f_0] \mid A_{H/V}(f_-) < A_0/2]:$  yes (considering standard deviations), at frequency 0.2Hz (OK)
- #2.  $[\text{exists } f_+ \text{ in the range } [f_0, 4f_0] \mid A_{H/V}(f_+) < A_0/2]:$  yes, at frequency 2.3Hz (OK)
- #3.  $[A_0 > 2]: 2.6 > 2$  (OK)
- #4.  $[f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%]:$  (NO)
- #5.  $[\sigma_{\text{maf}} < \epsilon(f_0)]: 1.981 > 0.117$  (NO)
- #6.  $[\sigma_A(f_0) < \theta(f_0)]: 1.168 < 2$  (OK)

Please, be aware of possible industrial/man-induced peaks or spurious peaks due to meaningless numerical instabilities.

Remember that SESAME criteria should be considered in a flexible perspective and that if you modify the processing parameters they can change

# ACQUISIZIONE HVSR1

show data    reset

step#1 (optional) - deconvolve  
 120 Hz    new frequency    resample

step#2 - HV computation  
 both Real & Im    clean axes  
 20 window length (s)    Min. freq.: 0.5Hz  
 5 tapering (%)    amplitude threshold    test removal  
 10 HVSR threshold  
 5 spectral smoothing (Hanning window)  
 15% detrending order    no equalization  
 Particle motion, all HVSRs, time lapse and video  
 full output    compute

continually

3D motion  
 save video    show 3D motion

directivity analysis  
 frequencies to highlight: 1.0 5.0 10.0 Hz    compute

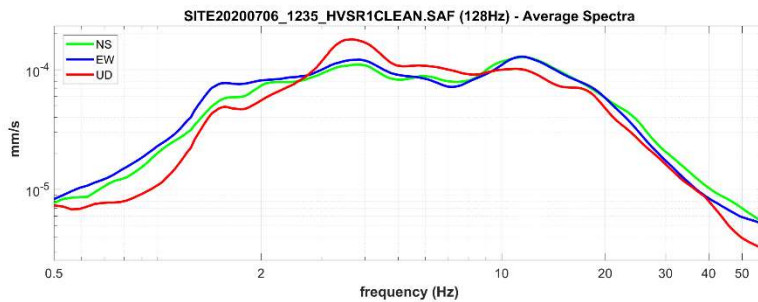
save-option#1: save HVSR as 8 ts  
 save HV from 0.5 to 60 Hz  
 save HV curve (as 8 ts)

pickling HV or amplitude spectra  
 HVSR    pick data  
 save pickled HV    compute

quick analysis (HVvs4H)  
 200 average Vs (m/s) (from surface to bedrock)  
 20 depth of the borehole (m)  
 1000 Vs of the bedrock  
 clean    compute

highlight a frequency  
 drawhighlight    10 Hz

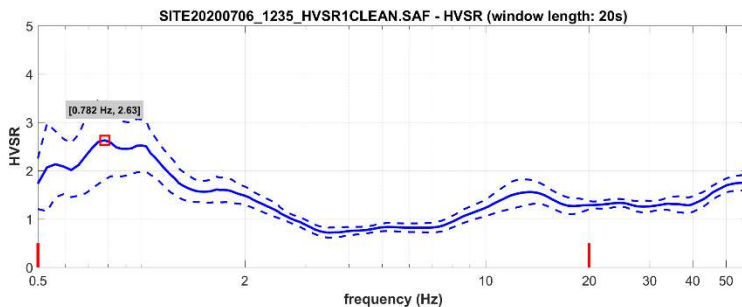
directivity over time  
 directivity in time    time step: 120 s



open working folder  
 show location  
 field notes

your comments

default axes



To model the HVSR (also jointly with MASW or ReMi/ESAC data), save the HV curve, go to the "Velocity Spectrumia, Modeling & Picking" panels and upload the saved HV curve

## HVSR vs Time (2D view)

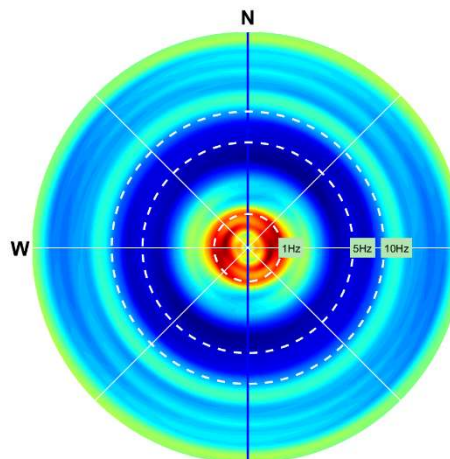
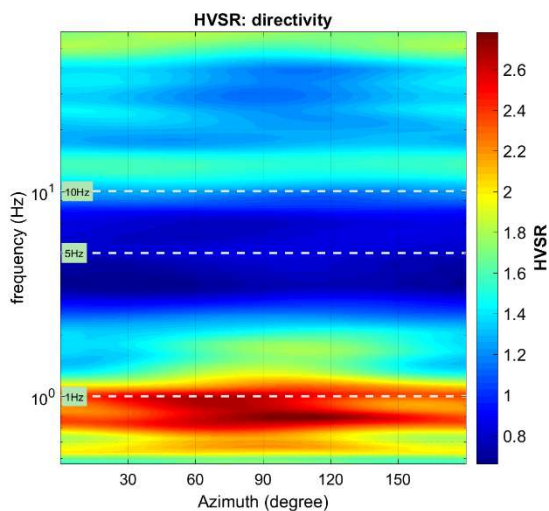
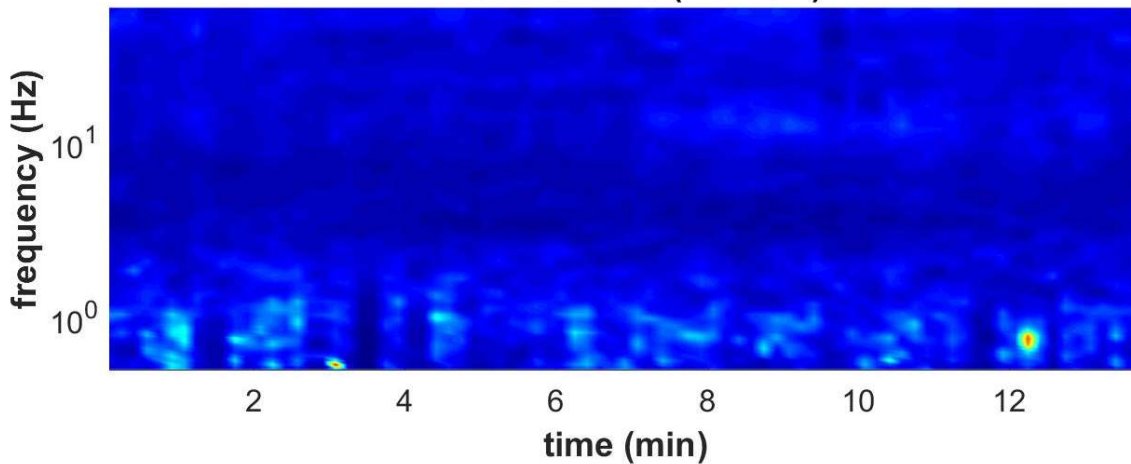
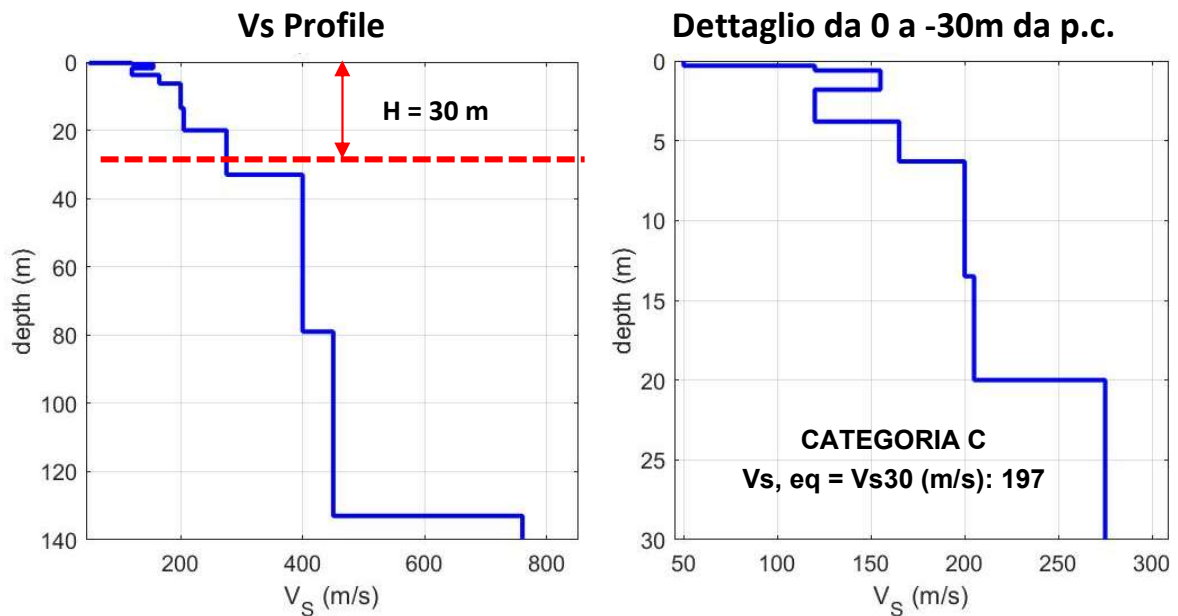


Tabella D - Stratigrafia sismica e parametri determinati.

Strato	Profondità [m]	Spessore [m]	Velocità onde di taglio	Rapporto di Poisson
1	0	0,3	50	0,33
2	0,3	0,3	120	0,16
3	0,6	1,2	155	0,22
4	1,8	2,0	120	0,50
5	3,8	2,5	165	0,15
6	6,3	7,2	200	0,45
7	13,5	6,5	205	0,33
8	20,0	13,0	275	0,15
9	33,0	46,0	400	0,15
10	79,0	54,0	450	0,37
11	133,0	Inf.	760	0,15



**C** - Depositi di terreni a grana grossa mediamente addensati o terreni a grana fina mediamente consistenti con profondità del substrato superiori a 30 m, caratterizzati da un miglioramento delle proprietà meccaniche con la profondità e da valori di velocità equivalente compresi tra 180 m/s e 360 m/s.

Tabella E - Calcolo  $V_{s, eq} = V_{s30}$  per i primi 2,5 m dalla profondità di appoggio della fondazione.

DETERMINAZIONE $V_{s, eq} = V_{s30}$		
Profondità appoggio	$V_{s, eq} = V_{s30}$ [m/s]	Categoria di sottosuolo
P.C.	197	C
-0,5m	205	C
-1m	207	C
-1,5m	209	C
-2,0m	212	C
-2,5m	216	C



GEO GROUP s.r.l.

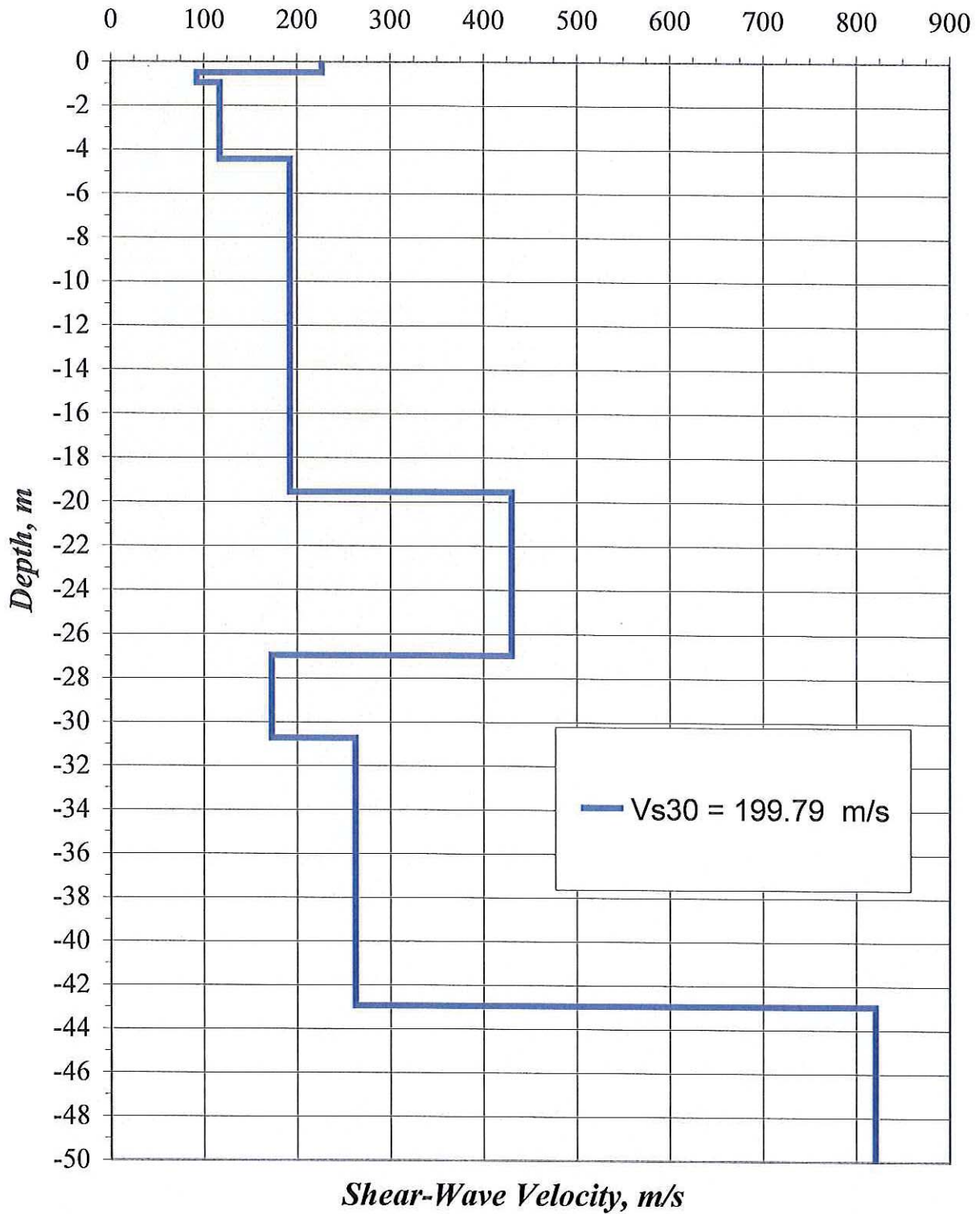
Via Cesare Costa, 182 (Mo)

P.IVA e C.F. 02981500362

Tel. 059-828367/059-3967169; Fax 059-5332019;

### Comune di Medolla (MO) - via San Matteo

10 Marzo 2008





GEO GROUP s.r.l.

Via Cesare Costa, 182 (Mo)

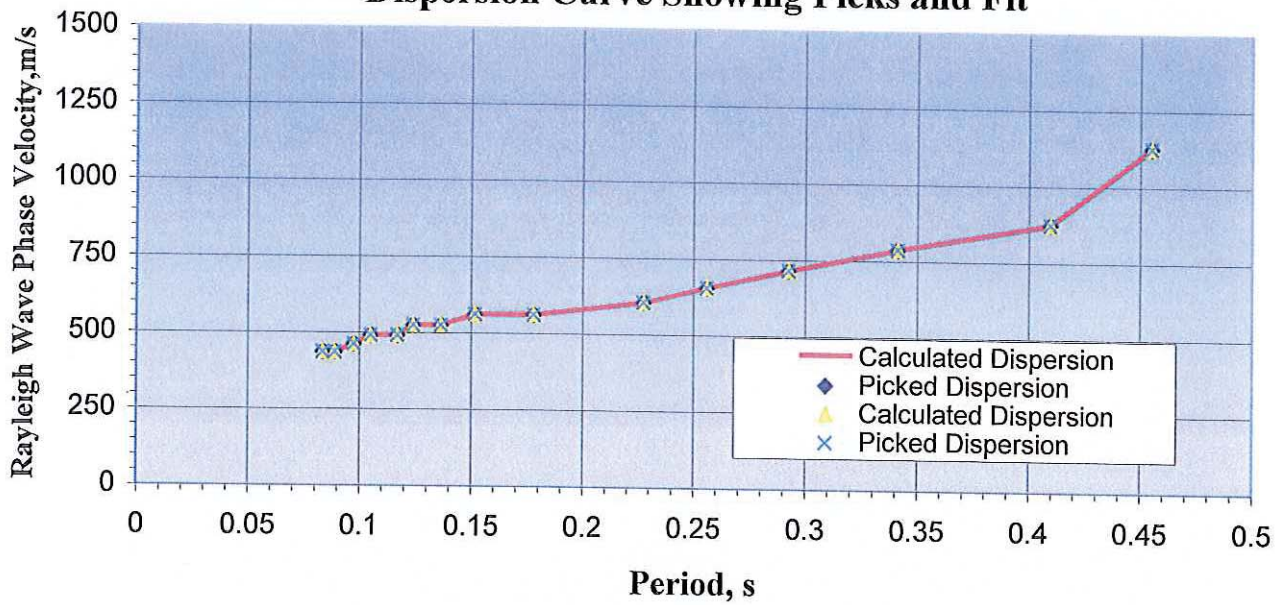
P.IVA e C.F. 02981500362

Tel. 059-828367/059-3967169; Fax 059-5332019;

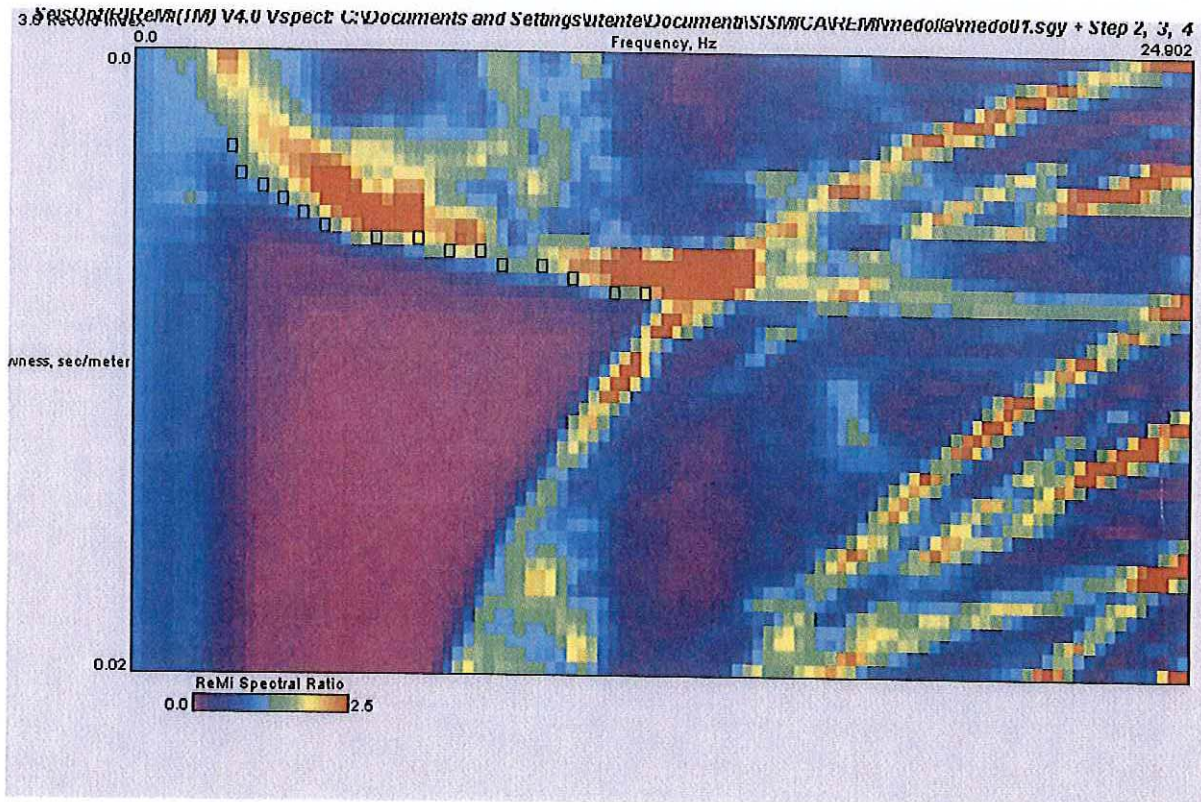
## Comune di Medolla (MO) - via San Matteo

10 Marzo 2008

### Dispersion Curve Showing Picks and Fit



### p-f Image with Dispersion Modeling Picks

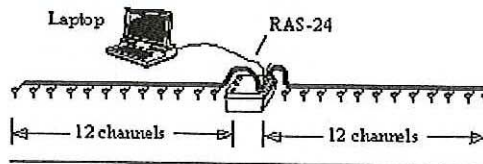


## CARATTERISTICHE TECNICHE DEL SISMOGRAFO

### ABEM RAS 24



24-channel Layout



#### Specifications:

Number of Channels:	12 or 24 per RAS module, up to 240 channels per system (10 modules)
Sample Intervals:	0.125, 0.25, 0.5, 1, 2 and 4 ms
Record Length:	4 ms - 64 sec, 2 ms - 32 sec, 1 ms - 16 sec, .5 ms - 8 sec, .25 ms - 4 sec, .125 ms - 2 sec
Multiline Operation:	10 lines
CDP Operation:	2D: Automatic or manual roll of entire spread 3D: Managed by RAS-24 script editor
Stacking:	Vertical stack
Cable:	One 12 takeout cable for 12 channel system. Two for 24 channel system
Laptop to RAS Interval:	1200ft maximum 3 pair wire
RAS to RAS Interval:	5000ft maximum 2 pair wire
Recording Format:	SEG-2, SEG-D 8038, SEG-D 8058
A/D Resolution:	24 bits using Delta-Sigma A/D converters - one per channel
Preamp Gain (PG):	12db, 24db, 36db or 48db, remotely selectable
Frequency Response:	.125 ms: 2 - 3300Hz, .25 ms: 2 - 1650 Hz, .5 ms: 2 - 825 Hz, 1 ms: 2 - 412 Hz, 2 ms: 2 - 206 Hz, 4 ms: 2 - 103 Hz
Dynamic Range:	112db @ 2 ms PG=36db, 117db @ 2 ms PG=12db (typ)
Distortion (THD):	.005% at 25 Hz, 2 ms sample interval (typ)
Crosstalk:	Greater than 90db
CMR:	Greater than 90db @ 60 Hz
Max Input Signal:	880 mVRMS @ 12db, 55 mVRMS @ 36db
Input Noise:	.21 mVRMS @ 2ms PG=36db, 1.6 mVRMS @ 2ms PG=12db (typ)
Anti-Alias Filters:	4 ms 103 Hz, 2 ms 206 Hz, 1 ms 412 Hz, .5 ms 825 Hz, .25ms 1650 Hz, .125ms 3300 Hz
Test Oscillator:	10, 25, 50, 60, 100, 125, 200, 250 Hz Amplitude adjustable in 10 mV steps
Instrument Tests:	Internal digital tests, battery voltage, internal voltage, crosstalk, amplifier pulse, CMR, amplifier noise, dynamic range, gain & phase similarity, system timing, communications, trigger verification
Line Tests:	Geophone pulse, geophone similarity, geophone resistance, cable leakage

# **ALLEGATO 3**

***Verifica alla liquefazione***

**LIQUEFACTION ANALYSIS REPORT**

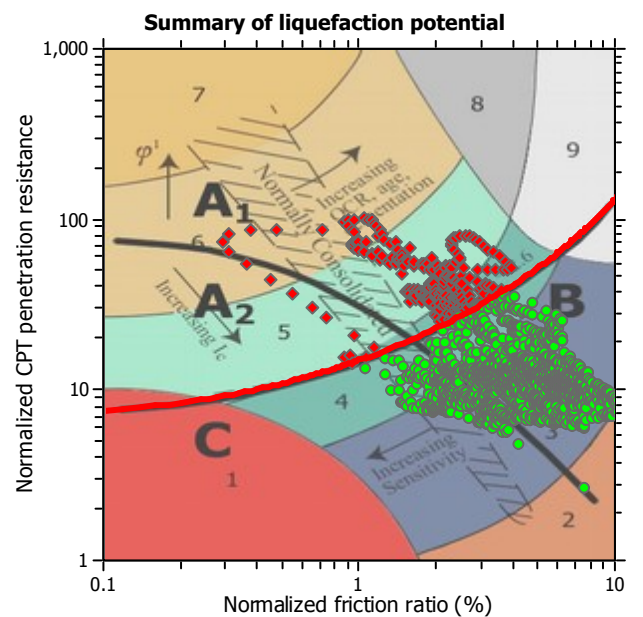
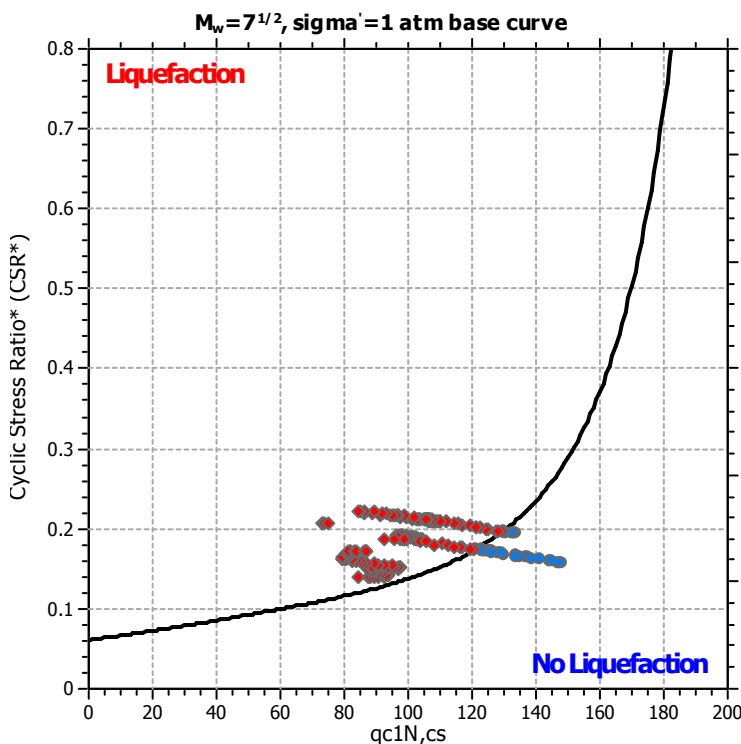
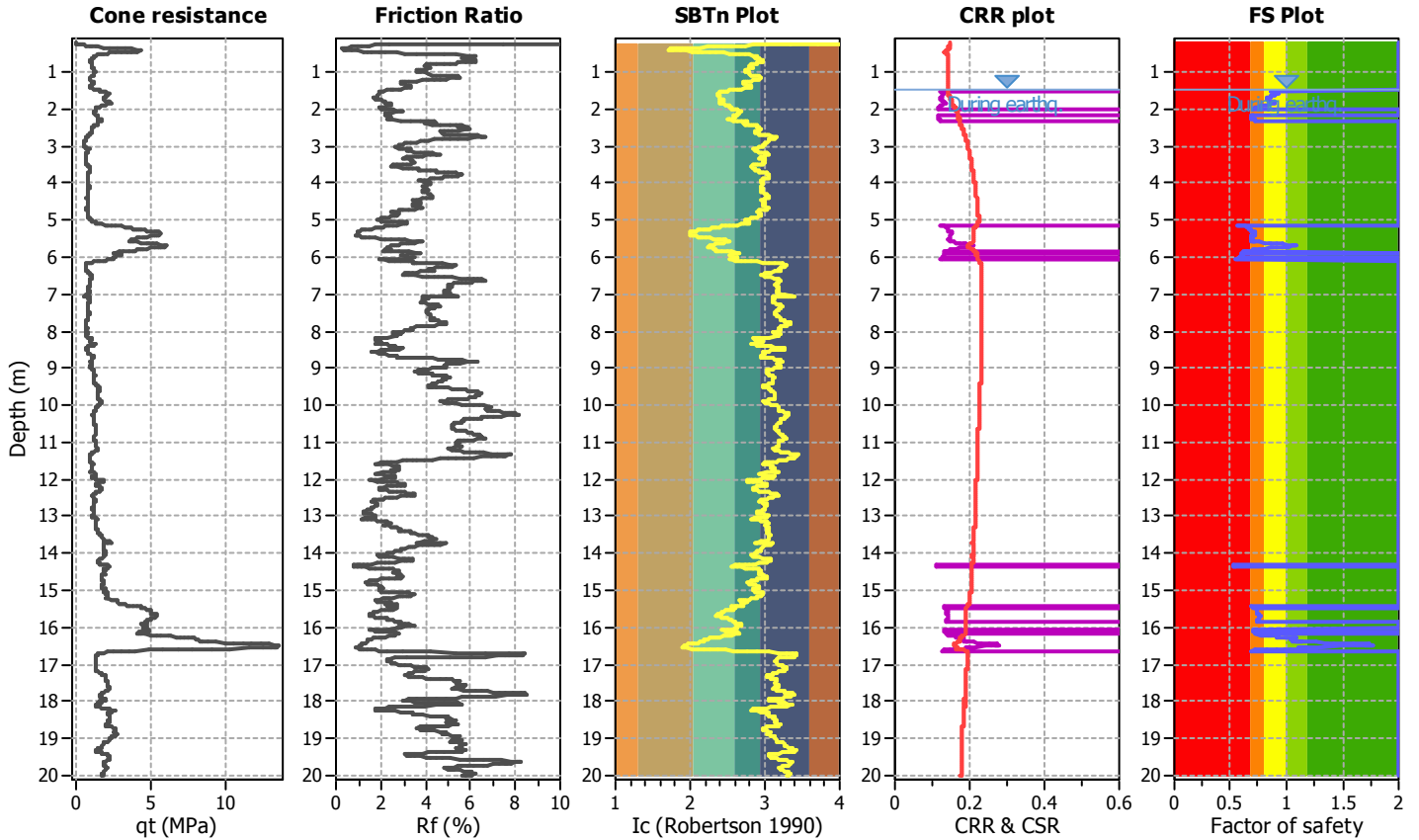
**Project title : Dr. Sergio Lasagna**

**Location : P.U.A. Via Romana - Medolla**

**CPT file : CPTU 1**

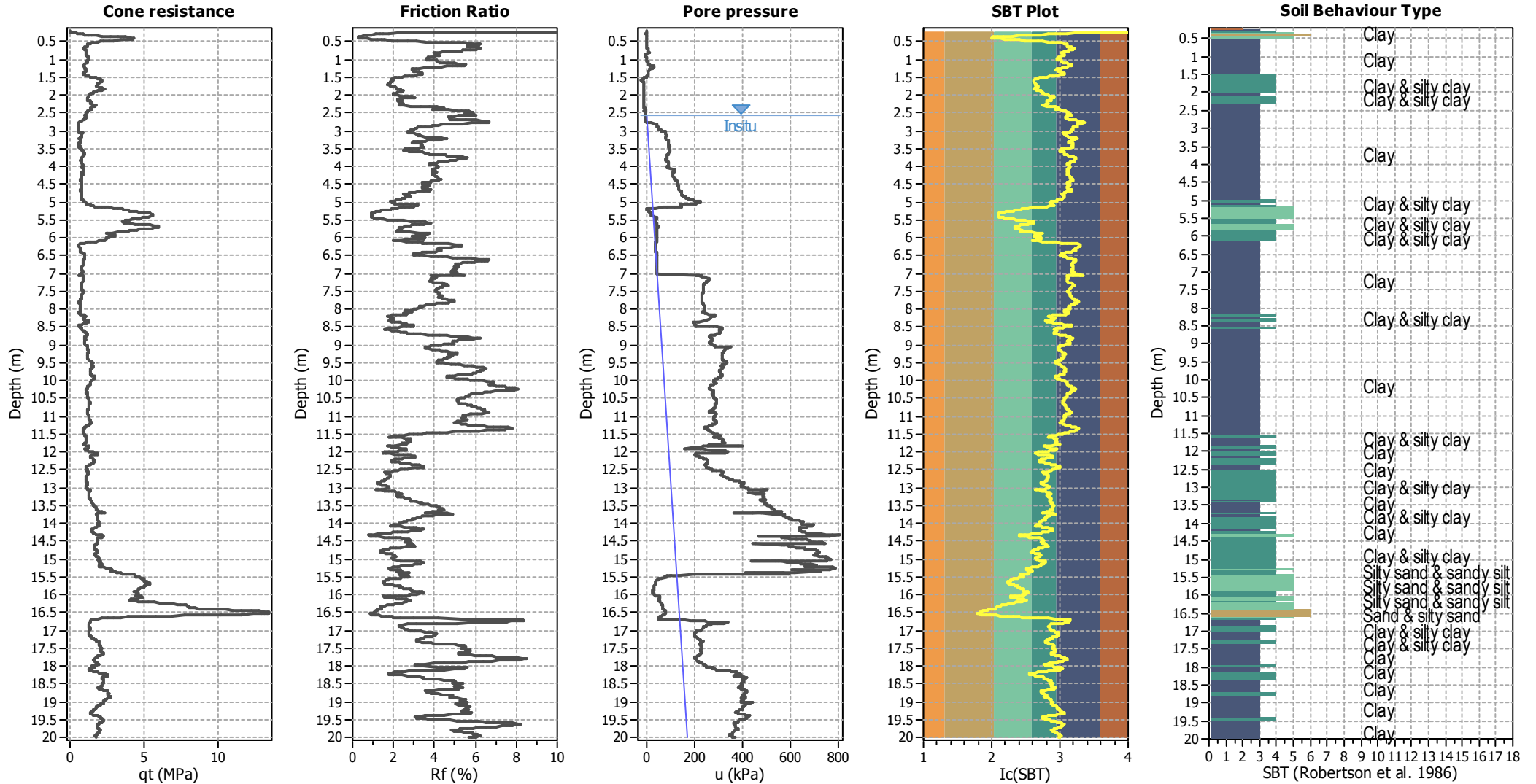
**Input parameters and analysis data**

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.55 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude $M_w$ :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	$K_\sigma$ applied:	No		



Zone A<sub>1</sub>: Cyclic liquefaction likely depending on size and duration of cyclic loading  
 Zone A<sub>2</sub>: Cyclic liquefaction and strength loss likely depending on loading and ground geometry  
 Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening  
 Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

### CPT basic interpretation plots



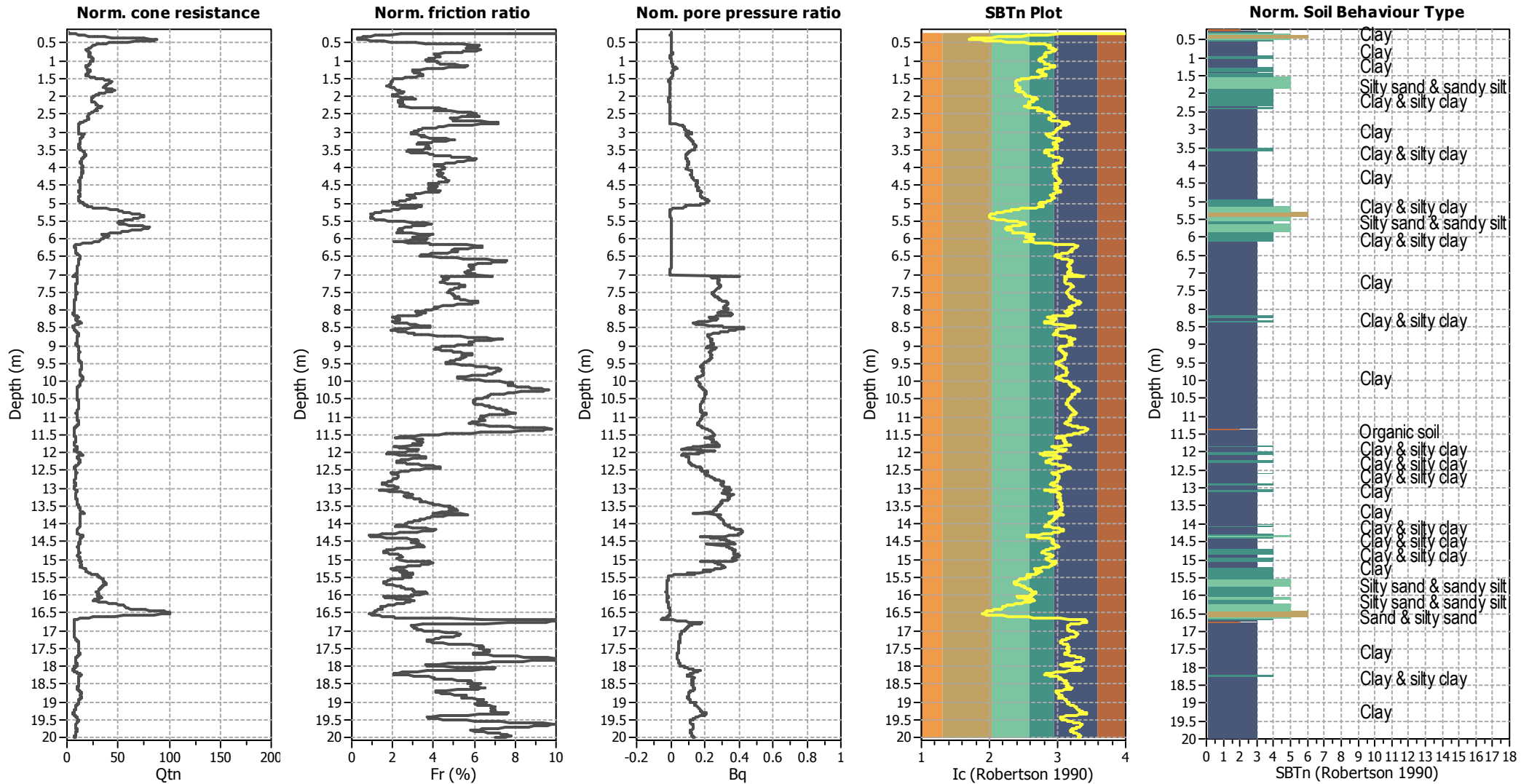
#### Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>0</sub> applied:	No
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

#### SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

### CPT basic interpretation plots (normalized)



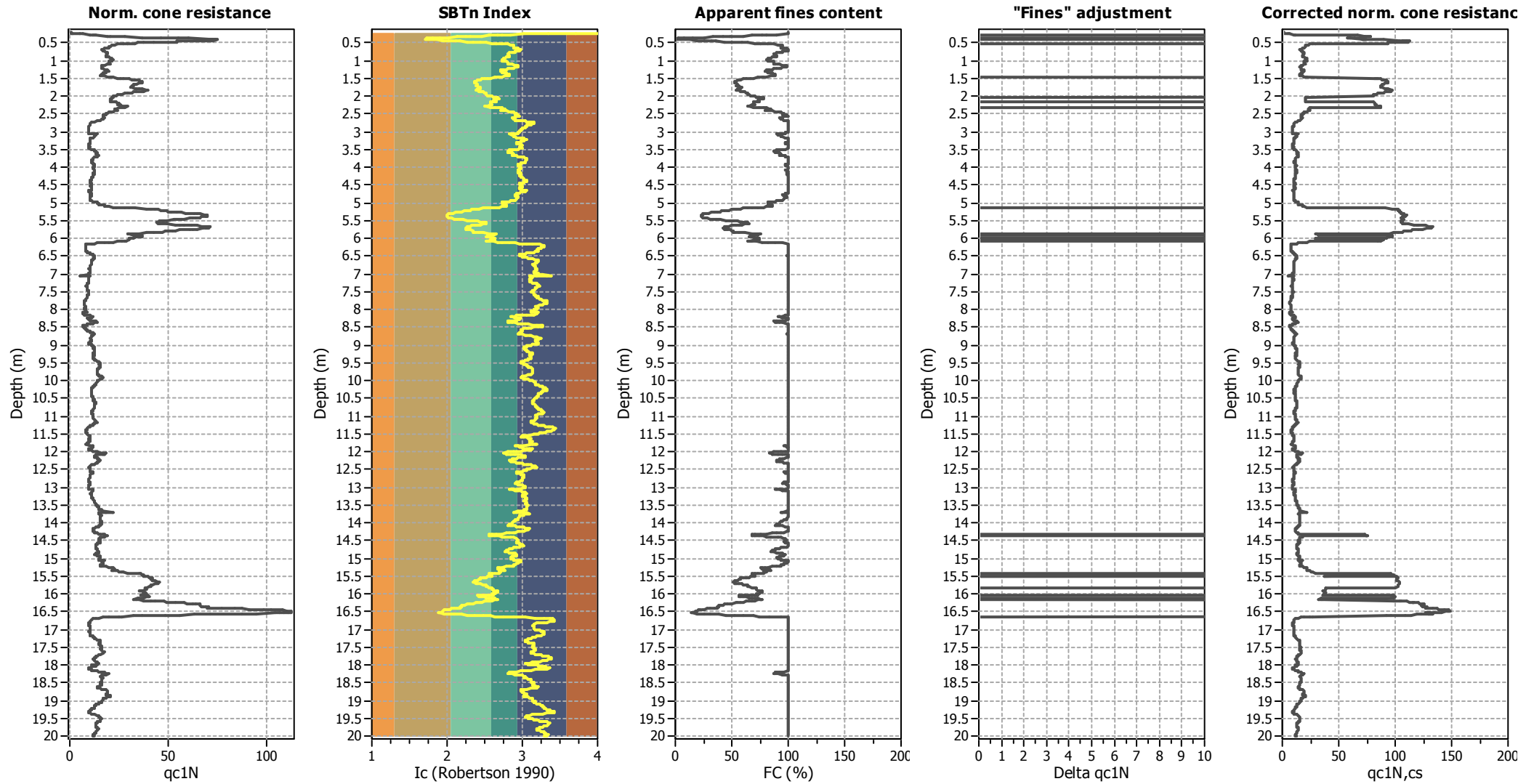
#### Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>0</sub> applied:	No
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

#### SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

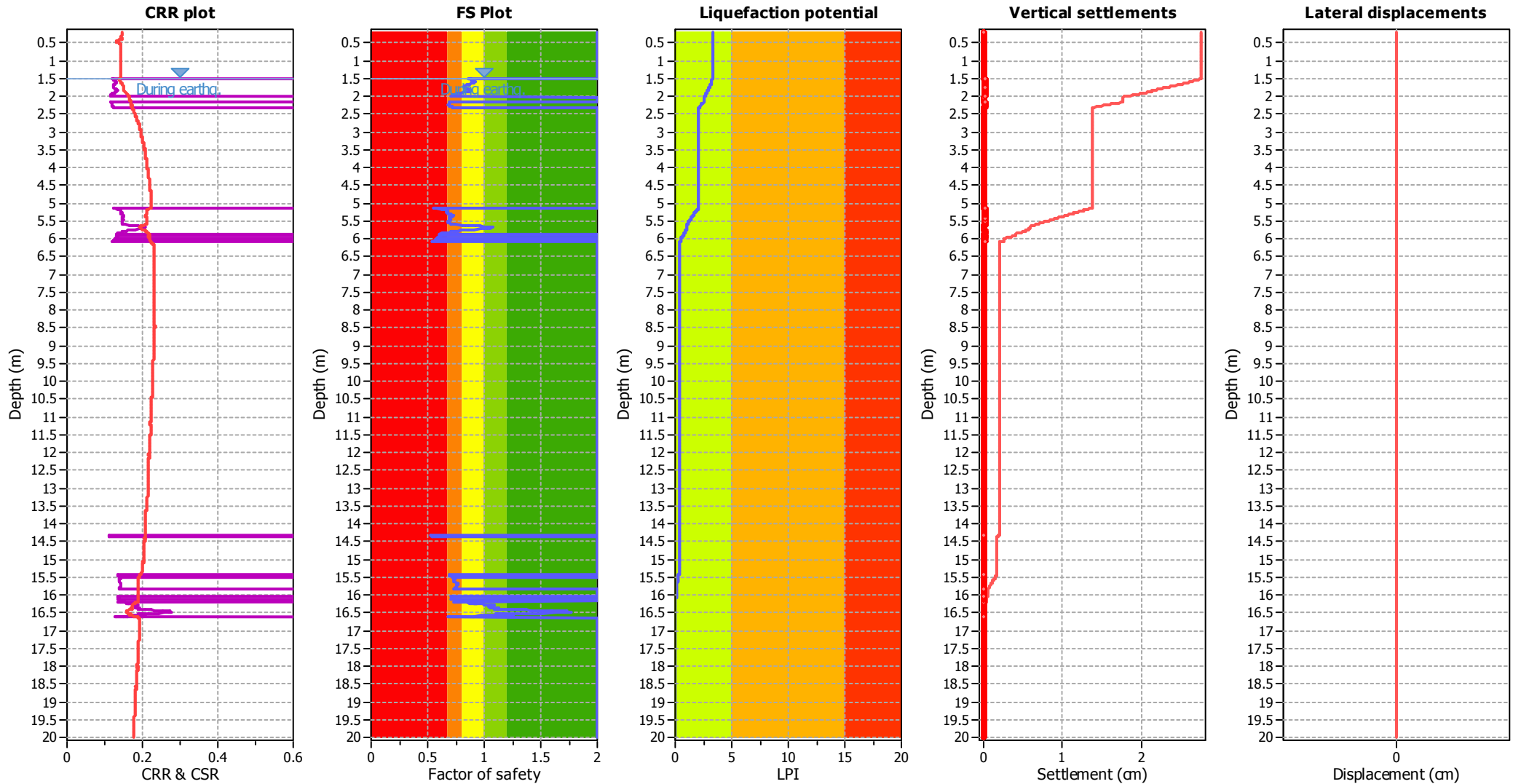
### Liquefaction analysis overall plots (intermediate results)



#### Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>v</sub> applied:	No
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

### Liquefaction analysis overall plots



#### Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>v</sub> applied:	No
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

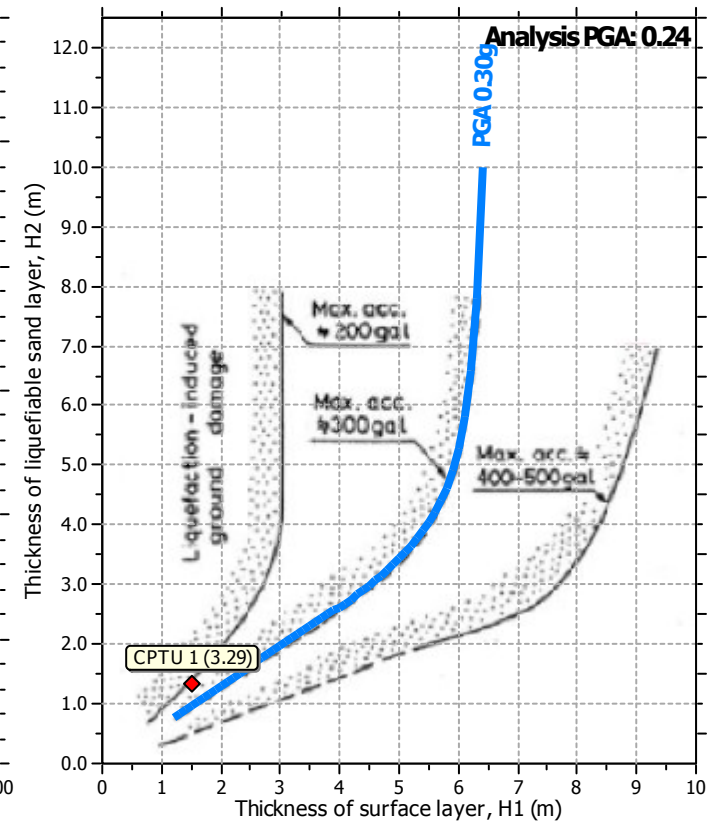
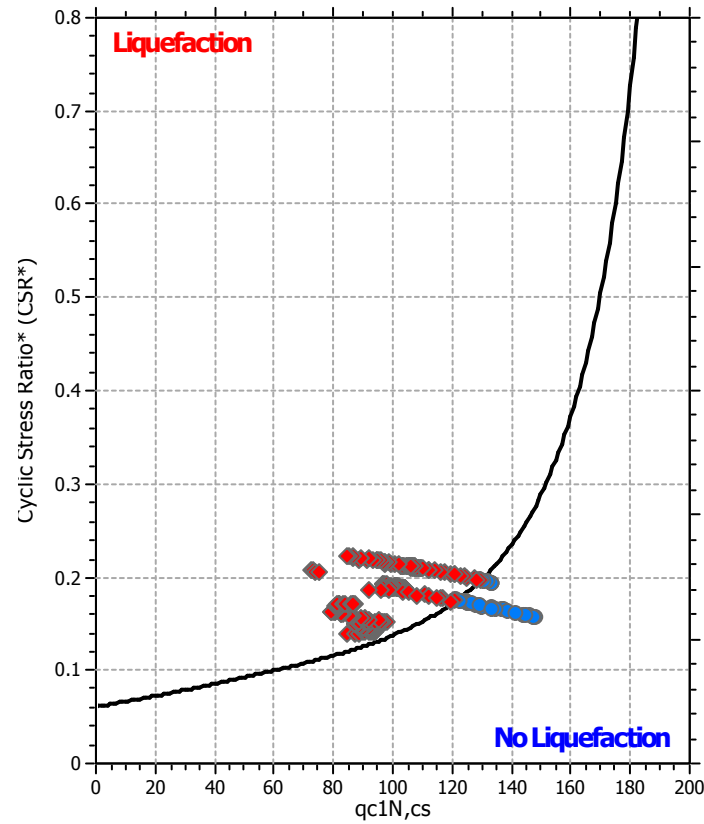
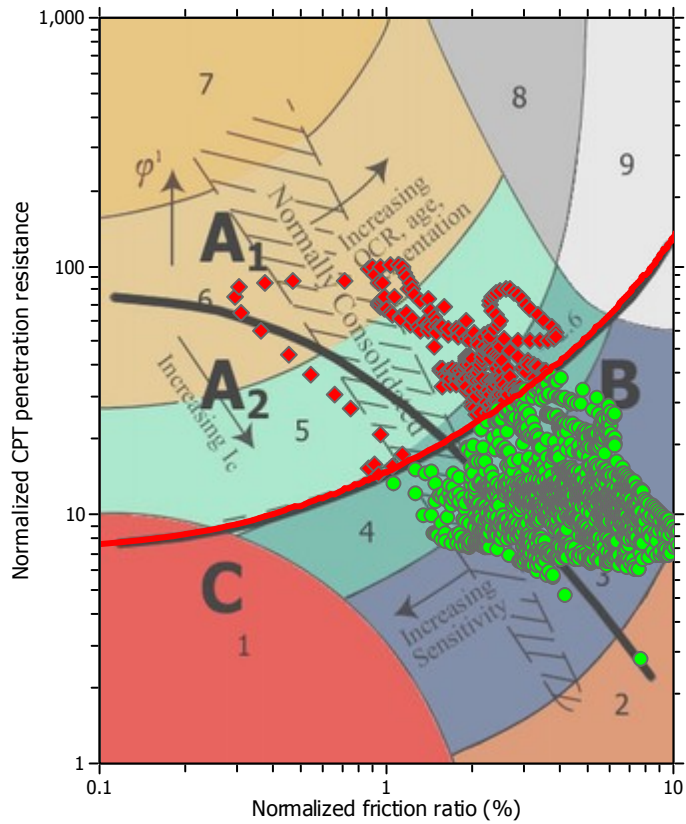
#### F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

#### LPI color scheme

- Very high risk
- High risk
- Low risk

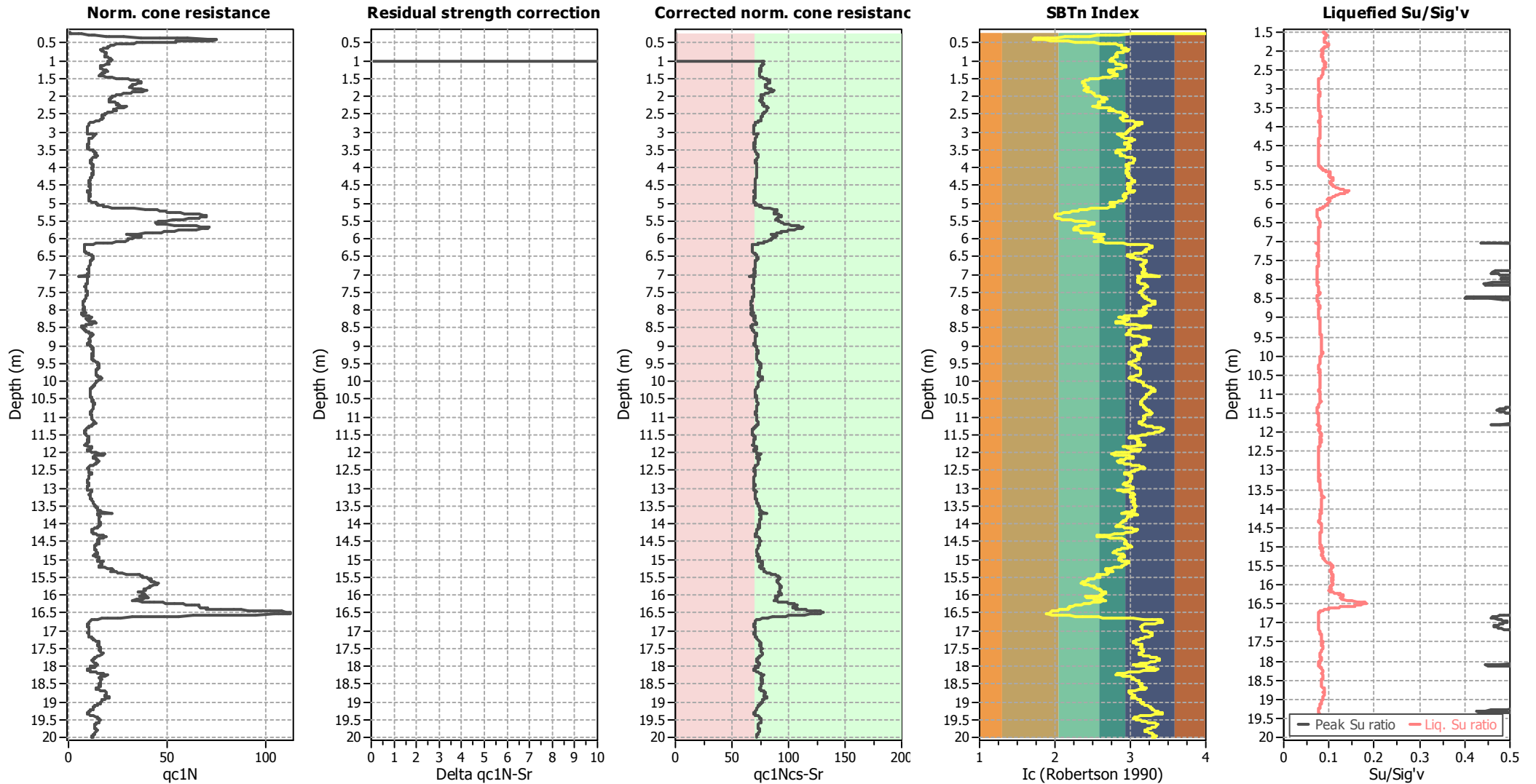
### Liquefaction analysis summary plots



#### Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>σ</sub> applied:	No
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

### Check for strength loss plots (Idriss & Boulanger (2008))



#### Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>q</sub> applied:	No
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

:: Liquefaction Potential Index calculation data ::											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
0.20	2.00	0.00	9.90	0.01	0.00	0.21	2.00	0.00	9.90	0.01	0.00
0.22	2.00	0.00	9.89	0.01	0.00	0.23	2.00	0.00	9.89	0.01	0.00
0.24	2.00	0.00	9.88	0.01	0.00	0.25	2.00	0.00	9.88	0.01	0.00
0.26	2.00	0.00	9.87	0.01	0.00	0.27	2.00	0.00	9.87	0.01	0.00
0.28	2.00	0.00	9.86	0.01	0.00	0.29	2.00	0.00	9.86	0.01	0.00
0.30	2.00	0.00	9.85	0.01	0.00	0.31	2.00	0.00	9.85	0.01	0.00
0.32	2.00	0.00	9.84	0.01	0.00	0.33	2.00	0.00	9.84	0.01	0.00
0.34	2.00	0.00	9.83	0.01	0.00	0.35	2.00	0.00	9.82	0.01	0.00
0.36	2.00	0.00	9.82	0.01	0.00	0.37	2.00	0.00	9.82	0.01	0.00
0.38	2.00	0.00	9.81	0.01	0.00	0.39	2.00	0.00	9.81	0.01	0.00
0.40	2.00	0.00	9.80	0.01	0.00	0.41	2.00	0.00	9.80	0.01	0.00
0.42	2.00	0.00	9.79	0.01	0.00	0.43	2.00	0.00	9.79	0.01	0.00
0.44	2.00	0.00	9.78	0.01	0.00	0.45	2.00	0.00	9.78	0.01	0.00
0.46	2.00	0.00	9.77	0.01	0.00	0.47	2.00	0.00	9.77	0.01	0.00
0.48	2.00	0.00	9.76	0.01	0.00	0.49	2.00	0.00	9.76	0.01	0.00
0.50	2.00	0.00	9.75	0.01	0.00	0.51	2.00	0.00	9.74	0.01	0.00
0.52	2.00	0.00	9.74	0.01	0.00	0.53	2.00	0.00	9.74	0.01	0.00
0.54	2.00	0.00	9.73	0.01	0.00	0.55	2.00	0.00	9.73	0.01	0.00
0.56	2.00	0.00	9.72	0.01	0.00	0.57	2.00	0.00	9.72	0.01	0.00
0.58	2.00	0.00	9.71	0.01	0.00	0.59	2.00	0.00	9.71	0.01	0.00
0.60	2.00	0.00	9.70	0.01	0.00	0.61	2.00	0.00	9.70	0.01	0.00
0.62	2.00	0.00	9.69	0.01	0.00	0.63	2.00	0.00	9.69	0.01	0.00
0.64	2.00	0.00	9.68	0.01	0.00	0.65	2.00	0.00	9.68	0.01	0.00
0.66	2.00	0.00	9.67	0.01	0.00	0.67	2.00	0.00	9.66	0.01	0.00
0.68	2.00	0.00	9.66	0.01	0.00	0.69	2.00	0.00	9.66	0.01	0.00
0.70	2.00	0.00	9.65	0.01	0.00	0.71	2.00	0.00	9.65	0.01	0.00
0.72	2.00	0.00	9.64	0.01	0.00	0.73	2.00	0.00	9.64	0.01	0.00
0.74	2.00	0.00	9.63	0.01	0.00	0.75	2.00	0.00	9.63	0.01	0.00
0.76	2.00	0.00	9.62	0.01	0.00	0.77	2.00	0.00	9.62	0.01	0.00
0.78	2.00	0.00	9.61	0.01	0.00	0.79	2.00	0.00	9.61	0.01	0.00
0.80	2.00	0.00	9.60	0.01	0.00	0.81	2.00	0.00	9.60	0.01	0.00
0.82	2.00	0.00	9.59	0.01	0.00	0.83	2.00	0.00	9.59	0.01	0.00
0.84	2.00	0.00	9.58	0.01	0.00	0.85	2.00	0.00	9.57	0.01	0.00
0.86	2.00	0.00	9.57	0.01	0.00	0.87	2.00	0.00	9.57	0.01	0.00
0.88	2.00	0.00	9.56	0.01	0.00	0.89	2.00	0.00	9.56	0.01	0.00
0.90	2.00	0.00	9.55	0.01	0.00	0.91	2.00	0.00	9.55	0.01	0.00
0.92	2.00	0.00	9.54	0.01	0.00	0.93	2.00	0.00	9.54	0.01	0.00
0.94	2.00	0.00	9.53	0.01	0.00	0.95	2.00	0.00	9.53	0.01	0.00
0.96	2.00	0.00	9.52	0.01	0.00	0.97	2.00	0.00	9.52	0.01	0.00
0.98	2.00	0.00	9.51	0.01	0.00	0.99	2.00	0.00	9.51	0.01	0.00
1.00	2.00	0.00	9.50	0.01	0.00	1.01	2.00	0.00	9.49	0.01	0.00
1.02	2.00	0.00	9.49	0.01	0.00	1.03	2.00	0.00	9.49	0.01	0.00
1.04	2.00	0.00	9.48	0.01	0.00	1.05	2.00	0.00	9.48	0.01	0.00
1.06	2.00	0.00	9.47	0.01	0.00	1.07	2.00	0.00	9.47	0.01	0.00
1.08	2.00	0.00	9.46	0.01	0.00	1.09	2.00	0.00	9.46	0.01	0.00
1.10	2.00	0.00	9.45	0.01	0.00	1.11	2.00	0.00	9.45	0.01	0.00
1.12	2.00	0.00	9.44	0.01	0.00	1.13	2.00	0.00	9.44	0.01	0.00
1.14	2.00	0.00	9.43	0.01	0.00	1.15	2.00	0.00	9.43	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
1.16	2.00	0.00	9.42	0.01	0.00	1.17	2.00	0.00	9.41	0.01	0.00
1.18	2.00	0.00	9.41	0.01	0.00	1.19	2.00	0.00	9.41	0.01	0.00
1.20	2.00	0.00	9.40	0.01	0.00	1.21	2.00	0.00	9.40	0.01	0.00
1.22	2.00	0.00	9.39	0.01	0.00	1.23	2.00	0.00	9.39	0.01	0.00
1.24	2.00	0.00	9.38	0.01	0.00	1.25	2.00	0.00	9.38	0.01	0.00
1.26	2.00	0.00	9.37	0.01	0.00	1.27	2.00	0.00	9.37	0.01	0.00
1.28	2.00	0.00	9.36	0.01	0.00	1.29	2.00	0.00	9.36	0.01	0.00
1.30	2.00	0.00	9.35	0.01	0.00	1.31	2.00	0.00	9.35	0.01	0.00
1.32	2.00	0.00	9.34	0.01	0.00	1.33	2.00	0.00	9.34	0.01	0.00
1.34	2.00	0.00	9.33	0.01	0.00	1.35	2.00	0.00	9.32	0.01	0.00
1.36	2.00	0.00	9.32	0.01	0.00	1.37	2.00	0.00	9.32	0.01	0.00
1.38	2.00	0.00	9.31	0.01	0.00	1.39	2.00	0.00	9.31	0.01	0.00
1.40	2.00	0.00	9.30	0.01	0.00	1.41	2.00	0.00	9.30	0.01	0.00
1.42	2.00	0.00	9.29	0.01	0.00	1.43	2.00	0.00	9.29	0.01	0.00
1.44	2.00	0.00	9.28	0.01	0.00	1.45	2.00	0.00	9.28	0.01	0.00
1.46	2.00	0.00	9.27	0.01	0.00	1.47	2.00	0.00	9.27	0.01	0.00
1.48	2.00	0.00	9.26	0.01	0.00	1.49	2.00	0.00	9.26	0.01	0.00
1.50	2.00	0.00	9.25	0.01	0.00	1.51	0.86	0.14	9.24	0.01	0.01
1.52	0.88	0.12	9.24	0.01	0.01	1.53	0.89	0.11	9.24	0.01	0.01
1.54	0.89	0.11	9.23	0.01	0.01	1.55	0.90	0.10	9.23	0.01	0.01
1.56	0.91	0.09	9.22	0.01	0.01	1.57	0.91	0.09	9.22	0.01	0.01
1.58	0.92	0.08	9.21	0.01	0.01	1.59	0.92	0.08	9.21	0.01	0.01
1.60	0.91	0.09	9.20	0.01	0.01	1.61	0.91	0.09	9.20	0.01	0.01
1.62	0.90	0.10	9.19	0.01	0.01	1.63	0.89	0.11	9.19	0.01	0.01
1.64	0.88	0.12	9.18	0.01	0.01	1.65	0.87	0.13	9.18	0.01	0.01
1.66	0.86	0.14	9.17	0.01	0.01	1.67	0.86	0.14	9.16	0.01	0.01
1.68	0.85	0.15	9.16	0.01	0.01	1.69	0.84	0.16	9.16	0.01	0.01
1.70	0.84	0.16	9.15	0.01	0.01	1.71	0.83	0.17	9.15	0.01	0.02
1.72	0.83	0.17	9.14	0.01	0.02	1.73	0.82	0.18	9.14	0.01	0.02
1.74	0.82	0.18	9.13	0.01	0.02	1.75	0.82	0.18	9.13	0.01	0.02
1.76	0.82	0.18	9.12	0.01	0.02	1.77	0.82	0.18	9.12	0.01	0.02
1.78	0.84	0.16	9.11	0.01	0.01	1.79	0.84	0.16	9.11	0.01	0.01
1.80	0.85	0.15	9.10	0.01	0.01	1.81	0.86	0.14	9.10	0.01	0.01
1.82	0.89	0.11	9.09	0.01	0.01	1.83	0.89	0.11	9.09	0.01	0.01
1.84	0.89	0.11	9.08	0.01	0.01	1.85	0.88	0.12	9.07	0.01	0.01
1.86	0.87	0.13	9.07	0.01	0.01	1.87	0.86	0.14	9.07	0.01	0.01
1.88	0.83	0.17	9.06	0.01	0.02	1.89	0.82	0.18	9.06	0.01	0.02
1.90	0.80	0.20	9.05	0.01	0.02	1.91	0.78	0.22	9.05	0.01	0.02
1.92	0.77	0.23	9.04	0.01	0.02	1.93	0.76	0.24	9.04	0.01	0.02
1.94	0.75	0.25	9.03	0.01	0.02	1.95	0.74	0.26	9.03	0.01	0.02
1.96	0.73	0.27	9.02	0.01	0.02	1.97	0.72	0.28	9.02	0.01	0.03
1.98	0.72	0.28	9.01	0.01	0.03	1.99	0.71	0.29	9.01	0.01	0.03
2.00	0.71	0.29	9.00	0.01	0.03	2.01	0.70	0.30	8.99	0.01	0.03
2.02	2.00	0.00	8.99	0.01	0.00	2.03	2.00	0.00	8.99	0.01	0.00
2.04	2.00	0.00	8.98	0.01	0.00	2.05	2.00	0.00	8.98	0.01	0.00
2.06	2.00	0.00	8.97	0.01	0.00	2.07	2.00	0.00	8.97	0.01	0.00
2.08	2.00	0.00	8.96	0.01	0.00	2.09	2.00	0.00	8.96	0.01	0.00
2.10	2.00	0.00	8.95	0.01	0.00	2.11	2.00	0.00	8.95	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
2.12	2.00	0.00	8.94	0.01	0.00	2.13	2.00	0.00	8.94	0.01	0.00
2.14	2.00	0.00	8.93	0.01	0.00	2.15	2.00	0.00	8.93	0.01	0.00
2.16	0.69	0.31	8.92	0.01	0.03	2.17	0.69	0.31	8.91	0.01	0.03
2.18	0.69	0.31	8.91	0.01	0.03	2.19	0.70	0.30	8.91	0.01	0.03
2.20	0.70	0.30	8.90	0.01	0.03	2.21	0.69	0.31	8.90	0.01	0.03
2.22	0.69	0.31	8.89	0.01	0.03	2.23	0.69	0.31	8.89	0.01	0.03
2.24	0.69	0.31	8.88	0.01	0.03	2.25	0.68	0.32	8.88	0.01	0.03
2.26	0.69	0.31	8.87	0.01	0.03	2.27	0.70	0.30	8.87	0.01	0.03
2.28	0.71	0.29	8.86	0.01	0.03	2.29	0.72	0.28	8.86	0.01	0.03
2.30	0.72	0.28	8.85	0.01	0.03	2.31	0.71	0.29	8.85	0.01	0.03
2.32	2.00	0.00	8.84	0.01	0.00	2.33	2.00	0.00	8.84	0.01	0.00
2.34	2.00	0.00	8.83	0.01	0.00	2.35	2.00	0.00	8.82	0.01	0.00
2.36	2.00	0.00	8.82	0.01	0.00	2.37	2.00	0.00	8.82	0.01	0.00
2.38	2.00	0.00	8.81	0.01	0.00	2.39	2.00	0.00	8.81	0.01	0.00
2.40	2.00	0.00	8.80	0.01	0.00	2.41	2.00	0.00	8.80	0.01	0.00
2.42	2.00	0.00	8.79	0.01	0.00	2.43	2.00	0.00	8.79	0.01	0.00
2.44	2.00	0.00	8.78	0.01	0.00	2.45	2.00	0.00	8.78	0.01	0.00
2.46	2.00	0.00	8.77	0.01	0.00	2.47	2.00	0.00	8.77	0.01	0.00
2.48	2.00	0.00	8.76	0.01	0.00	2.49	2.00	0.00	8.76	0.01	0.00
2.50	2.00	0.00	8.75	0.01	0.00	2.51	2.00	0.00	8.74	0.01	0.00
2.52	2.00	0.00	8.74	0.01	0.00	2.53	2.00	0.00	8.74	0.01	0.00
2.54	2.00	0.00	8.73	0.01	0.00	2.55	2.00	0.00	8.73	0.01	0.00
2.56	2.00	0.00	8.72	0.01	0.00	2.57	2.00	0.00	8.72	0.01	0.00
2.58	2.00	0.00	8.71	0.01	0.00	2.59	2.00	0.00	8.71	0.01	0.00
2.60	2.00	0.00	8.70	0.01	0.00	2.61	2.00	0.00	8.70	0.01	0.00
2.62	2.00	0.00	8.69	0.01	0.00	2.63	2.00	0.00	8.69	0.01	0.00
2.64	2.00	0.00	8.68	0.01	0.00	2.65	2.00	0.00	8.68	0.01	0.00
2.66	2.00	0.00	8.67	0.01	0.00	2.67	2.00	0.00	8.66	0.01	0.00
2.68	2.00	0.00	8.66	0.01	0.00	2.69	2.00	0.00	8.66	0.01	0.00
2.70	2.00	0.00	8.65	0.01	0.00	2.71	2.00	0.00	8.65	0.01	0.00
2.72	2.00	0.00	8.64	0.01	0.00	2.73	2.00	0.00	8.64	0.01	0.00
2.74	2.00	0.00	8.63	0.01	0.00	2.75	2.00	0.00	8.63	0.01	0.00
2.76	2.00	0.00	8.62	0.01	0.00	2.77	2.00	0.00	8.62	0.01	0.00
2.78	2.00	0.00	8.61	0.01	0.00	2.79	2.00	0.00	8.61	0.01	0.00
2.80	2.00	0.00	8.60	0.01	0.00	2.81	2.00	0.00	8.60	0.01	0.00
2.82	2.00	0.00	8.59	0.01	0.00	2.83	2.00	0.00	8.59	0.01	0.00
2.84	2.00	0.00	8.58	0.01	0.00	2.85	2.00	0.00	8.57	0.01	0.00
2.86	2.00	0.00	8.57	0.01	0.00	2.87	2.00	0.00	8.57	0.01	0.00
2.88	2.00	0.00	8.56	0.01	0.00	2.89	2.00	0.00	8.56	0.01	0.00
2.90	2.00	0.00	8.55	0.01	0.00	2.91	2.00	0.00	8.55	0.01	0.00
2.92	2.00	0.00	8.54	0.01	0.00	2.93	2.00	0.00	8.54	0.01	0.00
2.94	2.00	0.00	8.53	0.01	0.00	2.95	2.00	0.00	8.53	0.01	0.00
2.96	2.00	0.00	8.52	0.01	0.00	2.97	2.00	0.00	8.52	0.01	0.00
2.98	2.00	0.00	8.51	0.01	0.00	2.99	2.00	0.00	8.51	0.01	0.00
3.00	2.00	0.00	8.50	0.01	0.00	3.01	2.00	0.00	8.49	0.01	0.00
3.02	2.00	0.00	8.49	0.01	0.00	3.03	2.00	0.00	8.49	0.01	0.00
3.04	2.00	0.00	8.48	0.01	0.00	3.05	2.00	0.00	8.48	0.01	0.00
3.06	2.00	0.00	8.47	0.01	0.00	3.07	2.00	0.00	8.47	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
3.08	2.00	0.00	8.46	0.01	0.00	3.09	2.00	0.00	8.46	0.01	0.00
3.10	2.00	0.00	8.45	0.01	0.00	3.11	2.00	0.00	8.45	0.01	0.00
3.12	2.00	0.00	8.44	0.01	0.00	3.13	2.00	0.00	8.44	0.01	0.00
3.14	2.00	0.00	8.43	0.01	0.00	3.15	2.00	0.00	8.43	0.01	0.00
3.16	2.00	0.00	8.42	0.01	0.00	3.17	2.00	0.00	8.41	0.01	0.00
3.18	2.00	0.00	8.41	0.01	0.00	3.19	2.00	0.00	8.41	0.01	0.00
3.20	2.00	0.00	8.40	0.01	0.00	3.21	2.00	0.00	8.40	0.01	0.00
3.22	2.00	0.00	8.39	0.01	0.00	3.23	2.00	0.00	8.39	0.01	0.00
3.24	2.00	0.00	8.38	0.01	0.00	3.25	2.00	0.00	8.38	0.01	0.00
3.26	2.00	0.00	8.37	0.01	0.00	3.27	2.00	0.00	8.37	0.01	0.00
3.28	2.00	0.00	8.36	0.01	0.00	3.29	2.00	0.00	8.36	0.01	0.00
3.30	2.00	0.00	8.35	0.01	0.00	3.31	2.00	0.00	8.35	0.01	0.00
3.32	2.00	0.00	8.34	0.01	0.00	3.33	2.00	0.00	8.34	0.01	0.00
3.34	2.00	0.00	8.33	0.01	0.00	3.35	2.00	0.00	8.32	0.01	0.00
3.36	2.00	0.00	8.32	0.01	0.00	3.37	2.00	0.00	8.32	0.01	0.00
3.38	2.00	0.00	8.31	0.01	0.00	3.39	2.00	0.00	8.31	0.01	0.00
3.40	2.00	0.00	8.30	0.01	0.00	3.41	2.00	0.00	8.30	0.01	0.00
3.42	2.00	0.00	8.29	0.01	0.00	3.43	2.00	0.00	8.29	0.01	0.00
3.44	2.00	0.00	8.28	0.01	0.00	3.45	2.00	0.00	8.28	0.01	0.00
3.46	2.00	0.00	8.27	0.01	0.00	3.47	2.00	0.00	8.27	0.01	0.00
3.48	2.00	0.00	8.26	0.01	0.00	3.49	2.00	0.00	8.26	0.01	0.00
3.50	2.00	0.00	8.25	0.01	0.00	3.51	2.00	0.00	8.24	0.01	0.00
3.52	2.00	0.00	8.24	0.01	0.00	3.53	2.00	0.00	8.24	0.01	0.00
3.54	2.00	0.00	8.23	0.01	0.00	3.55	2.00	0.00	8.23	0.01	0.00
3.56	2.00	0.00	8.22	0.01	0.00	3.57	2.00	0.00	8.22	0.01	0.00
3.58	2.00	0.00	8.21	0.01	0.00	3.59	2.00	0.00	8.21	0.01	0.00
3.60	2.00	0.00	8.20	0.01	0.00	3.61	2.00	0.00	8.20	0.01	0.00
3.62	2.00	0.00	8.19	0.01	0.00	3.63	2.00	0.00	8.19	0.01	0.00
3.64	2.00	0.00	8.18	0.01	0.00	3.65	2.00	0.00	8.18	0.01	0.00
3.66	2.00	0.00	8.17	0.01	0.00	3.67	2.00	0.00	8.16	0.01	0.00
3.68	2.00	0.00	8.16	0.01	0.00	3.69	2.00	0.00	8.16	0.01	0.00
3.70	2.00	0.00	8.15	0.01	0.00	3.71	2.00	0.00	8.15	0.01	0.00
3.72	2.00	0.00	8.14	0.01	0.00	3.73	2.00	0.00	8.14	0.01	0.00
3.74	2.00	0.00	8.13	0.01	0.00	3.75	2.00	0.00	8.13	0.01	0.00
3.76	2.00	0.00	8.12	0.01	0.00	3.77	2.00	0.00	8.12	0.01	0.00
3.78	2.00	0.00	8.11	0.01	0.00	3.79	2.00	0.00	8.11	0.01	0.00
3.80	2.00	0.00	8.10	0.01	0.00	3.81	2.00	0.00	8.10	0.01	0.00
3.82	2.00	0.00	8.09	0.01	0.00	3.83	2.00	0.00	8.09	0.01	0.00
3.84	2.00	0.00	8.08	0.01	0.00	3.85	2.00	0.00	8.07	0.01	0.00
3.86	2.00	0.00	8.07	0.01	0.00	3.87	2.00	0.00	8.07	0.01	0.00
3.88	2.00	0.00	8.06	0.01	0.00	3.89	2.00	0.00	8.06	0.01	0.00
3.90	2.00	0.00	8.05	0.01	0.00	3.91	2.00	0.00	8.05	0.01	0.00
3.92	2.00	0.00	8.04	0.01	0.00	3.93	2.00	0.00	8.04	0.01	0.00
3.94	2.00	0.00	8.03	0.01	0.00	3.95	2.00	0.00	8.03	0.01	0.00
3.96	2.00	0.00	8.02	0.01	0.00	3.97	2.00	0.00	8.02	0.01	0.00
3.98	2.00	0.00	8.01	0.01	0.00	3.99	2.00	0.00	8.01	0.01	0.00
4.00	2.00	0.00	8.00	0.01	0.00	4.01	2.00	0.00	8.00	0.01	0.00
4.02	2.00	0.00	7.99	0.01	0.00	4.03	2.00	0.00	7.99	0.01	0.00

**:: Liquefaction Potential Index calculation data :: (continued)**

Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
4.04	2.00	0.00	7.98	0.01	0.00	4.05	2.00	0.00	7.98	0.01	0.00
4.06	2.00	0.00	7.97	0.01	0.00	4.07	2.00	0.00	7.97	0.01	0.00
4.08	2.00	0.00	7.96	0.01	0.00	4.09	2.00	0.00	7.96	0.01	0.00
4.10	2.00	0.00	7.95	0.01	0.00	4.11	2.00	0.00	7.95	0.01	0.00
4.12	2.00	0.00	7.94	0.01	0.00	4.13	2.00	0.00	7.94	0.01	0.00
4.14	2.00	0.00	7.93	0.01	0.00	4.15	2.00	0.00	7.93	0.01	0.00
4.16	2.00	0.00	7.92	0.01	0.00	4.17	2.00	0.00	7.92	0.01	0.00
4.18	2.00	0.00	7.91	0.01	0.00	4.19	2.00	0.00	7.91	0.01	0.00
4.20	2.00	0.00	7.90	0.01	0.00	4.21	2.00	0.00	7.90	0.01	0.00
4.22	2.00	0.00	7.89	0.01	0.00	4.23	2.00	0.00	7.89	0.01	0.00
4.24	2.00	0.00	7.88	0.01	0.00	4.25	2.00	0.00	7.88	0.01	0.00
4.26	2.00	0.00	7.87	0.01	0.00	4.27	2.00	0.00	7.87	0.01	0.00
4.28	2.00	0.00	7.86	0.01	0.00	4.29	2.00	0.00	7.86	0.01	0.00
4.30	2.00	0.00	7.85	0.01	0.00	4.31	2.00	0.00	7.85	0.01	0.00
4.32	2.00	0.00	7.84	0.01	0.00	4.33	2.00	0.00	7.84	0.01	0.00
4.34	2.00	0.00	7.83	0.01	0.00	4.35	2.00	0.00	7.83	0.01	0.00
4.36	2.00	0.00	7.82	0.01	0.00	4.37	2.00	0.00	7.82	0.01	0.00
4.38	2.00	0.00	7.81	0.01	0.00	4.39	2.00	0.00	7.81	0.01	0.00
4.40	2.00	0.00	7.80	0.01	0.00	4.41	2.00	0.00	7.80	0.01	0.00
4.42	2.00	0.00	7.79	0.01	0.00	4.43	2.00	0.00	7.79	0.01	0.00
4.44	2.00	0.00	7.78	0.01	0.00	4.45	2.00	0.00	7.78	0.01	0.00
4.46	2.00	0.00	7.77	0.01	0.00	4.47	2.00	0.00	7.77	0.01	0.00
4.48	2.00	0.00	7.76	0.01	0.00	4.49	2.00	0.00	7.76	0.01	0.00
4.50	2.00	0.00	7.75	0.01	0.00	4.51	2.00	0.00	7.75	0.01	0.00
4.52	2.00	0.00	7.74	0.01	0.00	4.53	2.00	0.00	7.74	0.01	0.00
4.54	2.00	0.00	7.73	0.01	0.00	4.55	2.00	0.00	7.73	0.01	0.00
4.56	2.00	0.00	7.72	0.01	0.00	4.57	2.00	0.00	7.72	0.01	0.00
4.58	2.00	0.00	7.71	0.01	0.00	4.59	2.00	0.00	7.71	0.01	0.00
4.60	2.00	0.00	7.70	0.01	0.00	4.61	2.00	0.00	7.70	0.01	0.00
4.62	2.00	0.00	7.69	0.01	0.00	4.63	2.00	0.00	7.69	0.01	0.00
4.64	2.00	0.00	7.68	0.01	0.00	4.65	2.00	0.00	7.68	0.01	0.00
4.66	2.00	0.00	7.67	0.01	0.00	4.67	2.00	0.00	7.67	0.01	0.00
4.68	2.00	0.00	7.66	0.01	0.00	4.69	2.00	0.00	7.66	0.01	0.00
4.70	2.00	0.00	7.65	0.01	0.00	4.71	2.00	0.00	7.65	0.01	0.00
4.72	2.00	0.00	7.64	0.01	0.00	4.73	2.00	0.00	7.64	0.01	0.00
4.74	2.00	0.00	7.63	0.01	0.00	4.75	2.00	0.00	7.63	0.01	0.00
4.76	2.00	0.00	7.62	0.01	0.00	4.77	2.00	0.00	7.62	0.01	0.00
4.78	2.00	0.00	7.61	0.01	0.00	4.79	2.00	0.00	7.61	0.01	0.00
4.80	2.00	0.00	7.60	0.01	0.00	4.81	2.00	0.00	7.60	0.01	0.00
4.82	2.00	0.00	7.59	0.01	0.00	4.83	2.00	0.00	7.59	0.01	0.00
4.84	2.00	0.00	7.58	0.01	0.00	4.85	2.00	0.00	7.58	0.01	0.00
4.86	2.00	0.00	7.57	0.01	0.00	4.87	2.00	0.00	7.57	0.01	0.00
4.88	2.00	0.00	7.56	0.01	0.00	4.89	2.00	0.00	7.56	0.01	0.00
4.90	2.00	0.00	7.55	0.01	0.00	4.91	2.00	0.00	7.55	0.01	0.00
4.92	2.00	0.00	7.54	0.01	0.00	4.93	2.00	0.00	7.54	0.01	0.00
4.94	2.00	0.00	7.53	0.01	0.00	4.95	2.00	0.00	7.53	0.01	0.00
4.96	2.00	0.00	7.52	0.01	0.00	4.97	2.00	0.00	7.52	0.01	0.00
4.98	2.00	0.00	7.51	0.01	0.00	4.99	2.00	0.00	7.51	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
5.00	2.00	0.00	7.50	0.01	0.00	5.01	2.00	0.00	7.50	0.01	0.00
5.02	2.00	0.00	7.49	0.01	0.00	5.03	2.00	0.00	7.49	0.01	0.00
5.04	2.00	0.00	7.48	0.01	0.00	5.05	2.00	0.00	7.48	0.01	0.00
5.06	2.00	0.00	7.47	0.01	0.00	5.07	2.00	0.00	7.47	0.01	0.00
5.08	2.00	0.00	7.46	0.01	0.00	5.09	2.00	0.00	7.46	0.01	0.00
5.10	2.00	0.00	7.45	0.01	0.00	5.11	2.00	0.00	7.45	0.01	0.00
5.12	2.00	0.00	7.44	0.01	0.00	5.13	2.00	0.00	7.44	0.01	0.00
5.14	0.56	0.44	7.43	0.01	0.03	5.15	0.57	0.43	7.43	0.01	0.03
5.16	0.58	0.42	7.42	0.01	0.03	5.17	0.62	0.38	7.42	0.01	0.03
5.18	0.64	0.36	7.41	0.01	0.03	5.19	0.65	0.35	7.41	0.01	0.03
5.20	0.67	0.33	7.40	0.01	0.02	5.21	0.67	0.33	7.40	0.01	0.02
5.22	0.66	0.34	7.39	0.01	0.02	5.23	0.67	0.33	7.39	0.01	0.02
5.24	0.67	0.33	7.38	0.01	0.02	5.25	0.67	0.33	7.38	0.01	0.02
5.26	0.67	0.33	7.37	0.01	0.02	5.27	0.68	0.32	7.37	0.01	0.02
5.28	0.68	0.32	7.36	0.01	0.02	5.29	0.68	0.32	7.36	0.01	0.02
5.30	0.70	0.30	7.35	0.01	0.02	5.31	0.69	0.31	7.35	0.01	0.02
5.32	0.70	0.30	7.34	0.01	0.02	5.33	0.72	0.28	7.34	0.01	0.02
5.34	0.72	0.28	7.33	0.01	0.02	5.35	0.73	0.27	7.33	0.01	0.02
5.36	0.73	0.27	7.32	0.01	0.02	5.37	0.72	0.28	7.32	0.01	0.02
5.38	0.72	0.28	7.31	0.01	0.02	5.39	0.71	0.29	7.31	0.01	0.02
5.40	0.70	0.30	7.30	0.01	0.02	5.41	0.70	0.30	7.30	0.01	0.02
5.42	0.69	0.31	7.29	0.01	0.02	5.43	0.69	0.31	7.29	0.01	0.02
5.44	0.70	0.30	7.28	0.01	0.02	5.45	0.69	0.31	7.28	0.01	0.02
5.46	0.70	0.30	7.27	0.01	0.02	5.47	0.70	0.30	7.27	0.01	0.02
5.48	0.71	0.29	7.26	0.01	0.02	5.49	0.69	0.31	7.26	0.01	0.02
5.50	0.69	0.31	7.25	0.01	0.02	5.51	0.69	0.31	7.25	0.01	0.02
5.52	0.68	0.32	7.24	0.01	0.02	5.53	0.69	0.31	7.24	0.01	0.02
5.54	0.68	0.32	7.23	0.01	0.02	5.55	0.69	0.31	7.23	0.01	0.02
5.56	0.69	0.31	7.22	0.01	0.02	5.57	0.70	0.30	7.22	0.01	0.02
5.58	0.71	0.29	7.21	0.01	0.02	5.59	0.71	0.29	7.21	0.01	0.02
5.60	0.75	0.25	7.20	0.01	0.02	5.61	0.81	0.19	7.20	0.01	0.01
5.62	0.84	0.16	7.19	0.01	0.01	5.63	0.86	0.14	7.19	0.01	0.01
5.64	0.92	0.08	7.18	0.01	0.01	5.65	0.96	0.04	7.18	0.01	0.00
5.66	1.00	0.00	7.17	0.01	0.00	5.67	1.08	0.00	7.17	0.01	0.00
5.68	1.08	0.00	7.16	0.01	0.00	5.69	1.08	0.00	7.16	0.01	0.00
5.70	1.05	0.00	7.15	0.01	0.00	5.71	1.02	0.00	7.15	0.01	0.00
5.72	1.00	0.00	7.14	0.01	0.00	5.73	0.97	0.03	7.14	0.01	0.00
5.74	0.91	0.09	7.13	0.01	0.01	5.75	0.88	0.12	7.13	0.01	0.01
5.76	0.86	0.14	7.12	0.01	0.01	5.77	0.79	0.21	7.12	0.01	0.01
5.78	0.77	0.23	7.11	0.01	0.02	5.79	0.75	0.25	7.11	0.01	0.02
5.80	0.73	0.27	7.10	0.01	0.02	5.81	0.70	0.30	7.10	0.01	0.02
5.82	0.69	0.31	7.09	0.01	0.02	5.83	0.69	0.31	7.09	0.01	0.02
5.84	0.65	0.35	7.08	0.01	0.02	5.85	0.63	0.37	7.08	0.01	0.03
5.86	0.61	0.39	7.07	0.01	0.03	5.87	2.00	0.00	7.07	0.01	0.00
5.88	2.00	0.00	7.06	0.01	0.00	5.89	2.00	0.00	7.06	0.01	0.00
5.90	2.00	0.00	7.05	0.01	0.00	5.91	0.60	0.40	7.05	0.01	0.03
5.92	0.62	0.38	7.04	0.01	0.03	5.93	0.62	0.38	7.04	0.01	0.03
5.94	0.62	0.38	7.03	0.01	0.03	5.95	0.61	0.39	7.03	0.01	0.03

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
5.96	0.60	0.40	7.02	0.01	0.03	5.97	0.59	0.41	7.02	0.01	0.03
5.98	0.58	0.42	7.01	0.01	0.03	5.99	2.00	0.00	7.01	0.01	0.00
6.00	2.00	0.00	7.00	0.01	0.00	6.01	2.00	0.00	7.00	0.01	0.00
6.02	2.00	0.00	6.99	0.01	0.00	6.03	2.00	0.00	6.99	0.01	0.00
6.04	2.00	0.00	6.98	0.01	0.00	6.05	0.57	0.43	6.98	0.01	0.03
6.06	0.55	0.45	6.97	0.01	0.03	6.07	0.54	0.46	6.97	0.01	0.03
6.08	0.54	0.46	6.96	0.01	0.03	6.09	2.00	0.00	6.96	0.01	0.00
6.10	2.00	0.00	6.95	0.01	0.00	6.11	2.00	0.00	6.95	0.01	0.00
6.12	2.00	0.00	6.94	0.01	0.00	6.13	2.00	0.00	6.94	0.01	0.00
6.14	2.00	0.00	6.93	0.01	0.00	6.15	2.00	0.00	6.93	0.01	0.00
6.16	2.00	0.00	6.92	0.01	0.00	6.17	2.00	0.00	6.92	0.01	0.00
6.18	2.00	0.00	6.91	0.01	0.00	6.19	2.00	0.00	6.91	0.01	0.00
6.20	2.00	0.00	6.90	0.01	0.00	6.21	2.00	0.00	6.90	0.01	0.00
6.22	2.00	0.00	6.89	0.01	0.00	6.23	2.00	0.00	6.89	0.01	0.00
6.24	2.00	0.00	6.88	0.01	0.00	6.25	2.00	0.00	6.88	0.01	0.00
6.26	2.00	0.00	6.87	0.01	0.00	6.27	2.00	0.00	6.87	0.01	0.00
6.28	2.00	0.00	6.86	0.01	0.00	6.29	2.00	0.00	6.86	0.01	0.00
6.30	2.00	0.00	6.85	0.01	0.00	6.31	2.00	0.00	6.85	0.01	0.00
6.32	2.00	0.00	6.84	0.01	0.00	6.33	2.00	0.00	6.84	0.01	0.00
6.34	2.00	0.00	6.83	0.01	0.00	6.35	2.00	0.00	6.83	0.01	0.00
6.36	2.00	0.00	6.82	0.01	0.00	6.37	2.00	0.00	6.82	0.01	0.00
6.38	2.00	0.00	6.81	0.01	0.00	6.39	2.00	0.00	6.81	0.01	0.00
6.40	2.00	0.00	6.80	0.01	0.00	6.41	2.00	0.00	6.80	0.01	0.00
6.42	2.00	0.00	6.79	0.01	0.00	6.43	2.00	0.00	6.79	0.01	0.00
6.44	2.00	0.00	6.78	0.01	0.00	6.45	2.00	0.00	6.78	0.01	0.00
6.46	2.00	0.00	6.77	0.01	0.00	6.47	2.00	0.00	6.77	0.01	0.00
6.48	2.00	0.00	6.76	0.01	0.00	6.49	2.00	0.00	6.76	0.01	0.00
6.50	2.00	0.00	6.75	0.01	0.00	6.51	2.00	0.00	6.75	0.01	0.00
6.52	2.00	0.00	6.74	0.01	0.00	6.53	2.00	0.00	6.74	0.01	0.00
6.54	2.00	0.00	6.73	0.01	0.00	6.55	2.00	0.00	6.73	0.01	0.00
6.56	2.00	0.00	6.72	0.01	0.00	6.57	2.00	0.00	6.72	0.01	0.00
6.58	2.00	0.00	6.71	0.01	0.00	6.59	2.00	0.00	6.71	0.01	0.00
6.60	2.00	0.00	6.70	0.01	0.00	6.61	2.00	0.00	6.70	0.01	0.00
6.62	2.00	0.00	6.69	0.01	0.00	6.63	2.00	0.00	6.69	0.01	0.00
6.64	2.00	0.00	6.68	0.01	0.00	6.65	2.00	0.00	6.68	0.01	0.00
6.66	2.00	0.00	6.67	0.01	0.00	6.67	2.00	0.00	6.67	0.01	0.00
6.68	2.00	0.00	6.66	0.01	0.00	6.69	2.00	0.00	6.66	0.01	0.00
6.70	2.00	0.00	6.65	0.01	0.00	6.71	2.00	0.00	6.65	0.01	0.00
6.72	2.00	0.00	6.64	0.01	0.00	6.73	2.00	0.00	6.64	0.01	0.00
6.74	2.00	0.00	6.63	0.01	0.00	6.75	2.00	0.00	6.63	0.01	0.00
6.76	2.00	0.00	6.62	0.01	0.00	6.77	2.00	0.00	6.62	0.01	0.00
6.78	2.00	0.00	6.61	0.01	0.00	6.79	2.00	0.00	6.61	0.01	0.00
6.80	2.00	0.00	6.60	0.01	0.00	6.81	2.00	0.00	6.60	0.01	0.00
6.82	2.00	0.00	6.59	0.01	0.00	6.83	2.00	0.00	6.59	0.01	0.00
6.84	2.00	0.00	6.58	0.01	0.00	6.85	2.00	0.00	6.58	0.01	0.00
6.86	2.00	0.00	6.57	0.01	0.00	6.87	2.00	0.00	6.57	0.01	0.00
6.88	2.00	0.00	6.56	0.01	0.00	6.89	2.00	0.00	6.56	0.01	0.00
6.90	2.00	0.00	6.55	0.01	0.00	6.91	2.00	0.00	6.55	0.01	0.00

**:: Liquefaction Potential Index calculation data :: (continued)**

Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
6.92	2.00	0.00	6.54	0.01	0.00	6.93	2.00	0.00	6.54	0.01	0.00
6.94	2.00	0.00	6.53	0.01	0.00	6.95	2.00	0.00	6.53	0.01	0.00
6.96	2.00	0.00	6.52	0.01	0.00	6.97	2.00	0.00	6.52	0.01	0.00
6.98	2.00	0.00	6.51	0.01	0.00	6.99	2.00	0.00	6.51	0.01	0.00
7.00	2.00	0.00	6.50	0.01	0.00	7.01	2.00	0.00	6.50	0.01	0.00
7.02	2.00	0.00	6.49	0.01	0.00	7.03	2.00	0.00	6.49	0.01	0.00
7.04	2.00	0.00	6.48	0.01	0.00	7.05	2.00	0.00	6.48	0.01	0.00
7.06	2.00	0.00	6.47	0.01	0.00	7.07	2.00	0.00	6.47	0.01	0.00
7.08	2.00	0.00	6.46	0.01	0.00	7.09	2.00	0.00	6.46	0.01	0.00
7.10	2.00	0.00	6.45	0.01	0.00	7.11	2.00	0.00	6.45	0.01	0.00
7.12	2.00	0.00	6.44	0.01	0.00	7.13	2.00	0.00	6.44	0.01	0.00
7.14	2.00	0.00	6.43	0.01	0.00	7.15	2.00	0.00	6.43	0.01	0.00
7.16	2.00	0.00	6.42	0.01	0.00	7.17	2.00	0.00	6.42	0.01	0.00
7.18	2.00	0.00	6.41	0.01	0.00	7.19	2.00	0.00	6.41	0.01	0.00
7.20	2.00	0.00	6.40	0.01	0.00	7.21	2.00	0.00	6.40	0.01	0.00
7.22	2.00	0.00	6.39	0.01	0.00	7.23	2.00	0.00	6.39	0.01	0.00
7.24	2.00	0.00	6.38	0.01	0.00	7.25	2.00	0.00	6.38	0.01	0.00
7.26	2.00	0.00	6.37	0.01	0.00	7.27	2.00	0.00	6.37	0.01	0.00
7.28	2.00	0.00	6.36	0.01	0.00	7.29	2.00	0.00	6.36	0.01	0.00
7.30	2.00	0.00	6.35	0.01	0.00	7.31	2.00	0.00	6.35	0.01	0.00
7.32	2.00	0.00	6.34	0.01	0.00	7.33	2.00	0.00	6.34	0.01	0.00
7.34	2.00	0.00	6.33	0.01	0.00	7.35	2.00	0.00	6.33	0.01	0.00
7.36	2.00	0.00	6.32	0.01	0.00	7.37	2.00	0.00	6.32	0.01	0.00
7.38	2.00	0.00	6.31	0.01	0.00	7.39	2.00	0.00	6.31	0.01	0.00
7.40	2.00	0.00	6.30	0.01	0.00	7.41	2.00	0.00	6.30	0.01	0.00
7.42	2.00	0.00	6.29	0.01	0.00	7.43	2.00	0.00	6.29	0.01	0.00
7.44	2.00	0.00	6.28	0.01	0.00	7.45	2.00	0.00	6.28	0.01	0.00
7.46	2.00	0.00	6.27	0.01	0.00	7.47	2.00	0.00	6.27	0.01	0.00
7.48	2.00	0.00	6.26	0.01	0.00	7.49	2.00	0.00	6.26	0.01	0.00
7.50	2.00	0.00	6.25	0.01	0.00	7.51	2.00	0.00	6.25	0.01	0.00
7.52	2.00	0.00	6.24	0.01	0.00	7.53	2.00	0.00	6.24	0.01	0.00
7.54	2.00	0.00	6.23	0.01	0.00	7.55	2.00	0.00	6.23	0.01	0.00
7.56	2.00	0.00	6.22	0.01	0.00	7.57	2.00	0.00	6.22	0.01	0.00
7.58	2.00	0.00	6.21	0.01	0.00	7.59	2.00	0.00	6.21	0.01	0.00
7.60	2.00	0.00	6.20	0.01	0.00	7.61	2.00	0.00	6.20	0.01	0.00
7.62	2.00	0.00	6.19	0.01	0.00	7.63	2.00	0.00	6.19	0.01	0.00
7.64	2.00	0.00	6.18	0.01	0.00	7.65	2.00	0.00	6.18	0.01	0.00
7.66	2.00	0.00	6.17	0.01	0.00	7.67	2.00	0.00	6.17	0.01	0.00
7.68	2.00	0.00	6.16	0.01	0.00	7.69	2.00	0.00	6.16	0.01	0.00
7.70	2.00	0.00	6.15	0.01	0.00	7.71	2.00	0.00	6.15	0.01	0.00
7.72	2.00	0.00	6.14	0.01	0.00	7.73	2.00	0.00	6.14	0.01	0.00
7.74	2.00	0.00	6.13	0.01	0.00	7.75	2.00	0.00	6.13	0.01	0.00
7.76	2.00	0.00	6.12	0.01	0.00	7.77	2.00	0.00	6.12	0.01	0.00
7.78	2.00	0.00	6.11	0.01	0.00	7.79	2.00	0.00	6.11	0.01	0.00
7.80	2.00	0.00	6.10	0.01	0.00	7.81	2.00	0.00	6.10	0.01	0.00
7.82	2.00	0.00	6.09	0.01	0.00	7.83	2.00	0.00	6.09	0.01	0.00
7.84	2.00	0.00	6.08	0.01	0.00	7.85	2.00	0.00	6.08	0.01	0.00
7.86	2.00	0.00	6.07	0.01	0.00	7.87	2.00	0.00	6.07	0.01	0.00

**:: Liquefaction Potential Index calculation data :: (continued)**

Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
7.88	2.00	0.00	6.06	0.01	0.00	7.89	2.00	0.00	6.06	0.01	0.00
7.90	2.00	0.00	6.05	0.01	0.00	7.91	2.00	0.00	6.05	0.01	0.00
7.92	2.00	0.00	6.04	0.01	0.00	7.93	2.00	0.00	6.04	0.01	0.00
7.94	2.00	0.00	6.03	0.01	0.00	7.95	2.00	0.00	6.03	0.01	0.00
7.96	2.00	0.00	6.02	0.01	0.00	7.97	2.00	0.00	6.02	0.01	0.00
7.98	2.00	0.00	6.01	0.01	0.00	7.99	2.00	0.00	6.01	0.01	0.00
8.00	2.00	0.00	6.00	0.01	0.00	8.01	2.00	0.00	6.00	0.01	0.00
8.02	2.00	0.00	5.99	0.01	0.00	8.03	2.00	0.00	5.99	0.01	0.00
8.04	2.00	0.00	5.98	0.01	0.00	8.05	2.00	0.00	5.98	0.01	0.00
8.06	2.00	0.00	5.97	0.01	0.00	8.07	2.00	0.00	5.97	0.01	0.00
8.08	2.00	0.00	5.96	0.01	0.00	8.09	2.00	0.00	5.96	0.01	0.00
8.10	2.00	0.00	5.95	0.01	0.00	8.11	2.00	0.00	5.95	0.01	0.00
8.12	2.00	0.00	5.94	0.01	0.00	8.13	2.00	0.00	5.94	0.01	0.00
8.14	2.00	0.00	5.93	0.01	0.00	8.15	2.00	0.00	5.93	0.01	0.00
8.16	2.00	0.00	5.92	0.01	0.00	8.17	2.00	0.00	5.92	0.01	0.00
8.18	2.00	0.00	5.91	0.01	0.00	8.19	2.00	0.00	5.91	0.01	0.00
8.20	2.00	0.00	5.90	0.01	0.00	8.21	2.00	0.00	5.90	0.01	0.00
8.22	2.00	0.00	5.89	0.01	0.00	8.23	2.00	0.00	5.89	0.01	0.00
8.24	2.00	0.00	5.88	0.01	0.00	8.25	2.00	0.00	5.88	0.01	0.00
8.26	2.00	0.00	5.87	0.01	0.00	8.27	2.00	0.00	5.87	0.01	0.00
8.28	2.00	0.00	5.86	0.01	0.00	8.29	2.00	0.00	5.86	0.01	0.00
8.30	2.00	0.00	5.85	0.01	0.00	8.31	2.00	0.00	5.85	0.01	0.00
8.32	2.00	0.00	5.84	0.01	0.00	8.33	2.00	0.00	5.84	0.01	0.00
8.34	2.00	0.00	5.83	0.01	0.00	8.35	2.00	0.00	5.83	0.01	0.00
8.36	2.00	0.00	5.82	0.01	0.00	8.37	2.00	0.00	5.82	0.01	0.00
8.38	2.00	0.00	5.81	0.01	0.00	8.39	2.00	0.00	5.81	0.01	0.00
8.40	2.00	0.00	5.80	0.01	0.00	8.41	2.00	0.00	5.80	0.01	0.00
8.42	2.00	0.00	5.79	0.01	0.00	8.43	2.00	0.00	5.79	0.01	0.00
8.44	2.00	0.00	5.78	0.01	0.00	8.45	2.00	0.00	5.78	0.01	0.00
8.46	2.00	0.00	5.77	0.01	0.00	8.47	2.00	0.00	5.77	0.01	0.00
8.48	2.00	0.00	5.76	0.01	0.00	8.49	2.00	0.00	5.76	0.01	0.00
8.50	2.00	0.00	5.75	0.01	0.00	8.51	2.00	0.00	5.75	0.01	0.00
8.52	2.00	0.00	5.74	0.01	0.00	8.53	2.00	0.00	5.74	0.01	0.00
8.54	2.00	0.00	5.73	0.01	0.00	8.55	2.00	0.00	5.72	0.01	0.00
8.56	2.00	0.00	5.72	0.01	0.00	8.57	2.00	0.00	5.72	0.01	0.00
8.58	2.00	0.00	5.71	0.01	0.00	8.59	2.00	0.00	5.71	0.01	0.00
8.60	2.00	0.00	5.70	0.01	0.00	8.61	2.00	0.00	5.70	0.01	0.00
8.62	2.00	0.00	5.69	0.01	0.00	8.63	2.00	0.00	5.68	0.01	0.00
8.64	2.00	0.00	5.68	0.01	0.00	8.65	2.00	0.00	5.68	0.01	0.00
8.66	2.00	0.00	5.67	0.01	0.00	8.67	2.00	0.00	5.67	0.01	0.00
8.68	2.00	0.00	5.66	0.01	0.00	8.69	2.00	0.00	5.66	0.01	0.00
8.70	2.00	0.00	5.65	0.01	0.00	8.71	2.00	0.00	5.64	0.01	0.00
8.72	2.00	0.00	5.64	0.01	0.00	8.73	2.00	0.00	5.64	0.01	0.00
8.74	2.00	0.00	5.63	0.01	0.00	8.75	2.00	0.00	5.63	0.01	0.00
8.76	2.00	0.00	5.62	0.01	0.00	8.77	2.00	0.00	5.62	0.01	0.00
8.78	2.00	0.00	5.61	0.01	0.00	8.79	2.00	0.00	5.61	0.01	0.00
8.80	2.00	0.00	5.60	0.01	0.00	8.81	2.00	0.00	5.60	0.01	0.00
8.82	2.00	0.00	5.59	0.01	0.00	8.83	2.00	0.00	5.59	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
8.84	2.00	0.00	5.58	0.01	0.00	8.85	2.00	0.00	5.58	0.01	0.00
8.86	2.00	0.00	5.57	0.01	0.00	8.87	2.00	0.00	5.57	0.01	0.00
8.88	2.00	0.00	5.56	0.01	0.00	8.89	2.00	0.00	5.56	0.01	0.00
8.90	2.00	0.00	5.55	0.01	0.00	8.91	2.00	0.00	5.55	0.01	0.00
8.92	2.00	0.00	5.54	0.01	0.00	8.93	2.00	0.00	5.54	0.01	0.00
8.94	2.00	0.00	5.53	0.01	0.00	8.95	2.00	0.00	5.53	0.01	0.00
8.96	2.00	0.00	5.52	0.01	0.00	8.97	2.00	0.00	5.52	0.01	0.00
8.98	2.00	0.00	5.51	0.01	0.00	8.99	2.00	0.00	5.51	0.01	0.00
9.00	2.00	0.00	5.50	0.01	0.00	9.01	2.00	0.00	5.50	0.01	0.00
9.02	2.00	0.00	5.49	0.01	0.00	9.03	2.00	0.00	5.49	0.01	0.00
9.04	2.00	0.00	5.48	0.01	0.00	9.05	2.00	0.00	5.47	0.01	0.00
9.06	2.00	0.00	5.47	0.01	0.00	9.07	2.00	0.00	5.47	0.01	0.00
9.08	2.00	0.00	5.46	0.01	0.00	9.09	2.00	0.00	5.46	0.01	0.00
9.10	2.00	0.00	5.45	0.01	0.00	9.11	2.00	0.00	5.45	0.01	0.00
9.12	2.00	0.00	5.44	0.01	0.00	9.13	2.00	0.00	5.43	0.01	0.00
9.14	2.00	0.00	5.43	0.01	0.00	9.15	2.00	0.00	5.43	0.01	0.00
9.16	2.00	0.00	5.42	0.01	0.00	9.17	2.00	0.00	5.42	0.01	0.00
9.18	2.00	0.00	5.41	0.01	0.00	9.19	2.00	0.00	5.41	0.01	0.00
9.20	2.00	0.00	5.40	0.01	0.00	9.21	2.00	0.00	5.39	0.01	0.00
9.22	2.00	0.00	5.39	0.01	0.00	9.23	2.00	0.00	5.39	0.01	0.00
9.24	2.00	0.00	5.38	0.01	0.00	9.25	2.00	0.00	5.38	0.01	0.00
9.26	2.00	0.00	5.37	0.01	0.00	9.27	2.00	0.00	5.37	0.01	0.00
9.28	2.00	0.00	5.36	0.01	0.00	9.29	2.00	0.00	5.36	0.01	0.00
9.30	2.00	0.00	5.35	0.01	0.00	9.31	2.00	0.00	5.35	0.01	0.00
9.32	2.00	0.00	5.34	0.01	0.00	9.33	2.00	0.00	5.34	0.01	0.00
9.34	2.00	0.00	5.33	0.01	0.00	9.35	2.00	0.00	5.33	0.01	0.00
9.36	2.00	0.00	5.32	0.01	0.00	9.37	2.00	0.00	5.32	0.01	0.00
9.38	2.00	0.00	5.31	0.01	0.00	9.39	2.00	0.00	5.31	0.01	0.00
9.40	2.00	0.00	5.30	0.01	0.00	9.41	2.00	0.00	5.30	0.01	0.00
9.42	2.00	0.00	5.29	0.01	0.00	9.43	2.00	0.00	5.29	0.01	0.00
9.44	2.00	0.00	5.28	0.01	0.00	9.45	2.00	0.00	5.28	0.01	0.00
9.46	2.00	0.00	5.27	0.01	0.00	9.47	2.00	0.00	5.27	0.01	0.00
9.48	2.00	0.00	5.26	0.01	0.00	9.49	2.00	0.00	5.26	0.01	0.00
9.50	2.00	0.00	5.25	0.01	0.00	9.51	2.00	0.00	5.25	0.01	0.00
9.52	2.00	0.00	5.24	0.01	0.00	9.53	2.00	0.00	5.24	0.01	0.00
9.54	2.00	0.00	5.23	0.01	0.00	9.55	2.00	0.00	5.22	0.01	0.00
9.56	2.00	0.00	5.22	0.01	0.00	9.57	2.00	0.00	5.22	0.01	0.00
9.58	2.00	0.00	5.21	0.01	0.00	9.59	2.00	0.00	5.21	0.01	0.00
9.60	2.00	0.00	5.20	0.01	0.00	9.61	2.00	0.00	5.20	0.01	0.00
9.62	2.00	0.00	5.19	0.01	0.00	9.63	2.00	0.00	5.18	0.01	0.00
9.64	2.00	0.00	5.18	0.01	0.00	9.65	2.00	0.00	5.18	0.01	0.00
9.66	2.00	0.00	5.17	0.01	0.00	9.67	2.00	0.00	5.17	0.01	0.00
9.68	2.00	0.00	5.16	0.01	0.00	9.69	2.00	0.00	5.16	0.01	0.00
9.70	2.00	0.00	5.15	0.01	0.00	9.71	2.00	0.00	5.14	0.01	0.00
9.72	2.00	0.00	5.14	0.01	0.00	9.73	2.00	0.00	5.14	0.01	0.00
9.74	2.00	0.00	5.13	0.01	0.00	9.75	2.00	0.00	5.13	0.01	0.00
9.76	2.00	0.00	5.12	0.01	0.00	9.77	2.00	0.00	5.12	0.01	0.00
9.78	2.00	0.00	5.11	0.01	0.00	9.79	2.00	0.00	5.11	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
9.80	2.00	0.00	5.10	0.01	0.00	9.81	2.00	0.00	5.10	0.01	0.00
9.82	2.00	0.00	5.09	0.01	0.00	9.83	2.00	0.00	5.09	0.01	0.00
9.84	2.00	0.00	5.08	0.01	0.00	9.85	2.00	0.00	5.08	0.01	0.00
9.86	2.00	0.00	5.07	0.01	0.00	9.87	2.00	0.00	5.07	0.01	0.00
9.88	2.00	0.00	5.06	0.01	0.00	9.89	2.00	0.00	5.06	0.01	0.00
9.90	2.00	0.00	5.05	0.01	0.00	9.91	2.00	0.00	5.05	0.01	0.00
9.92	2.00	0.00	5.04	0.01	0.00	9.93	2.00	0.00	5.04	0.01	0.00
9.94	2.00	0.00	5.03	0.01	0.00	9.95	2.00	0.00	5.03	0.01	0.00
9.96	2.00	0.00	5.02	0.01	0.00	9.97	2.00	0.00	5.02	0.01	0.00
9.98	2.00	0.00	5.01	0.01	0.00	9.99	2.00	0.00	5.01	0.01	0.00
10.00	2.00	0.00	5.00	0.01	0.00	10.01	2.00	0.00	5.00	0.01	0.00
10.02	2.00	0.00	4.99	0.01	0.00	10.03	2.00	0.00	4.99	0.01	0.00
10.04	2.00	0.00	4.98	0.01	0.00	10.05	2.00	0.00	4.97	0.01	0.00
10.06	2.00	0.00	4.97	0.01	0.00	10.07	2.00	0.00	4.97	0.01	0.00
10.08	2.00	0.00	4.96	0.01	0.00	10.09	2.00	0.00	4.96	0.01	0.00
10.10	2.00	0.00	4.95	0.01	0.00	10.11	2.00	0.00	4.95	0.01	0.00
10.12	2.00	0.00	4.94	0.01	0.00	10.13	2.00	0.00	4.93	0.01	0.00
10.14	2.00	0.00	4.93	0.01	0.00	10.15	2.00	0.00	4.93	0.01	0.00
10.16	2.00	0.00	4.92	0.01	0.00	10.17	2.00	0.00	4.92	0.01	0.00
10.18	2.00	0.00	4.91	0.01	0.00	10.19	2.00	0.00	4.91	0.01	0.00
10.20	2.00	0.00	4.90	0.01	0.00	10.21	2.00	0.00	4.89	0.01	0.00
10.22	2.00	0.00	4.89	0.01	0.00	10.23	2.00	0.00	4.89	0.01	0.00
10.24	2.00	0.00	4.88	0.01	0.00	10.25	2.00	0.00	4.88	0.01	0.00
10.26	2.00	0.00	4.87	0.01	0.00	10.27	2.00	0.00	4.87	0.01	0.00
10.28	2.00	0.00	4.86	0.01	0.00	10.29	2.00	0.00	4.86	0.01	0.00
10.30	2.00	0.00	4.85	0.01	0.00	10.31	2.00	0.00	4.85	0.01	0.00
10.32	2.00	0.00	4.84	0.01	0.00	10.33	2.00	0.00	4.84	0.01	0.00
10.34	2.00	0.00	4.83	0.01	0.00	10.35	2.00	0.00	4.83	0.01	0.00
10.36	2.00	0.00	4.82	0.01	0.00	10.37	2.00	0.00	4.82	0.01	0.00
10.38	2.00	0.00	4.81	0.01	0.00	10.39	2.00	0.00	4.81	0.01	0.00
10.40	2.00	0.00	4.80	0.01	0.00	10.41	2.00	0.00	4.80	0.01	0.00
10.42	2.00	0.00	4.79	0.01	0.00	10.43	2.00	0.00	4.79	0.01	0.00
10.44	2.00	0.00	4.78	0.01	0.00	10.45	2.00	0.00	4.78	0.01	0.00
10.46	2.00	0.00	4.77	0.01	0.00	10.47	2.00	0.00	4.77	0.01	0.00
10.48	2.00	0.00	4.76	0.01	0.00	10.49	2.00	0.00	4.76	0.01	0.00
10.50	2.00	0.00	4.75	0.01	0.00	10.51	2.00	0.00	4.75	0.01	0.00
10.52	2.00	0.00	4.74	0.01	0.00	10.53	2.00	0.00	4.74	0.01	0.00
10.54	2.00	0.00	4.73	0.01	0.00	10.55	2.00	0.00	4.72	0.01	0.00
10.56	2.00	0.00	4.72	0.01	0.00	10.57	2.00	0.00	4.72	0.01	0.00
10.58	2.00	0.00	4.71	0.01	0.00	10.59	2.00	0.00	4.71	0.01	0.00
10.60	2.00	0.00	4.70	0.01	0.00	10.61	2.00	0.00	4.70	0.01	0.00
10.62	2.00	0.00	4.69	0.01	0.00	10.63	2.00	0.00	4.68	0.01	0.00
10.64	2.00	0.00	4.68	0.01	0.00	10.65	2.00	0.00	4.68	0.01	0.00
10.66	2.00	0.00	4.67	0.01	0.00	10.67	2.00	0.00	4.67	0.01	0.00
10.68	2.00	0.00	4.66	0.01	0.00	10.69	2.00	0.00	4.66	0.01	0.00
10.70	2.00	0.00	4.65	0.01	0.00	10.71	2.00	0.00	4.64	0.01	0.00
10.72	2.00	0.00	4.64	0.01	0.00	10.73	2.00	0.00	4.64	0.01	0.00
10.74	2.00	0.00	4.63	0.01	0.00	10.75	2.00	0.00	4.63	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
10.76	2.00	0.00	4.62	0.01	0.00	10.77	2.00	0.00	4.62	0.01	0.00
10.78	2.00	0.00	4.61	0.01	0.00	10.79	2.00	0.00	4.61	0.01	0.00
10.80	2.00	0.00	4.60	0.01	0.00	10.81	2.00	0.00	4.60	0.01	0.00
10.82	2.00	0.00	4.59	0.01	0.00	10.83	2.00	0.00	4.59	0.01	0.00
10.84	2.00	0.00	4.58	0.01	0.00	10.85	2.00	0.00	4.58	0.01	0.00
10.86	2.00	0.00	4.57	0.01	0.00	10.87	2.00	0.00	4.57	0.01	0.00
10.88	2.00	0.00	4.56	0.01	0.00	10.89	2.00	0.00	4.56	0.01	0.00
10.90	2.00	0.00	4.55	0.01	0.00	10.91	2.00	0.00	4.55	0.01	0.00
10.92	2.00	0.00	4.54	0.01	0.00	10.93	2.00	0.00	4.54	0.01	0.00
10.94	2.00	0.00	4.53	0.01	0.00	10.95	2.00	0.00	4.53	0.01	0.00
10.96	2.00	0.00	4.52	0.01	0.00	10.97	2.00	0.00	4.52	0.01	0.00
10.98	2.00	0.00	4.51	0.01	0.00	10.99	2.00	0.00	4.51	0.01	0.00
11.00	2.00	0.00	4.50	0.01	0.00	11.01	2.00	0.00	4.50	0.01	0.00
11.02	2.00	0.00	4.49	0.01	0.00	11.03	2.00	0.00	4.49	0.01	0.00
11.04	2.00	0.00	4.48	0.01	0.00	11.05	2.00	0.00	4.47	0.01	0.00
11.06	2.00	0.00	4.47	0.01	0.00	11.07	2.00	0.00	4.47	0.01	0.00
11.08	2.00	0.00	4.46	0.01	0.00	11.09	2.00	0.00	4.46	0.01	0.00
11.10	2.00	0.00	4.45	0.01	0.00	11.11	2.00	0.00	4.45	0.01	0.00
11.12	2.00	0.00	4.44	0.01	0.00	11.13	2.00	0.00	4.43	0.01	0.00
11.14	2.00	0.00	4.43	0.01	0.00	11.15	2.00	0.00	4.43	0.01	0.00
11.16	2.00	0.00	4.42	0.01	0.00	11.17	2.00	0.00	4.42	0.01	0.00
11.18	2.00	0.00	4.41	0.01	0.00	11.19	2.00	0.00	4.41	0.01	0.00
11.20	2.00	0.00	4.40	0.01	0.00	11.21	2.00	0.00	4.39	0.01	0.00
11.22	2.00	0.00	4.39	0.01	0.00	11.23	2.00	0.00	4.39	0.01	0.00
11.24	2.00	0.00	4.38	0.01	0.00	11.25	2.00	0.00	4.38	0.01	0.00
11.26	2.00	0.00	4.37	0.01	0.00	11.27	2.00	0.00	4.37	0.01	0.00
11.28	2.00	0.00	4.36	0.01	0.00	11.29	2.00	0.00	4.36	0.01	0.00
11.30	2.00	0.00	4.35	0.01	0.00	11.31	2.00	0.00	4.35	0.01	0.00
11.32	2.00	0.00	4.34	0.01	0.00	11.33	2.00	0.00	4.34	0.01	0.00
11.34	2.00	0.00	4.33	0.01	0.00	11.35	2.00	0.00	4.33	0.01	0.00
11.36	2.00	0.00	4.32	0.01	0.00	11.37	2.00	0.00	4.32	0.01	0.00
11.38	2.00	0.00	4.31	0.01	0.00	11.39	2.00	0.00	4.31	0.01	0.00
11.40	2.00	0.00	4.30	0.01	0.00	11.41	2.00	0.00	4.30	0.01	0.00
11.42	2.00	0.00	4.29	0.01	0.00	11.43	2.00	0.00	4.29	0.01	0.00
11.44	2.00	0.00	4.28	0.01	0.00	11.45	2.00	0.00	4.28	0.01	0.00
11.46	2.00	0.00	4.27	0.01	0.00	11.47	2.00	0.00	4.27	0.01	0.00
11.48	2.00	0.00	4.26	0.01	0.00	11.49	2.00	0.00	4.26	0.01	0.00
11.50	2.00	0.00	4.25	0.01	0.00	11.51	2.00	0.00	4.25	0.01	0.00
11.52	2.00	0.00	4.24	0.01	0.00	11.53	2.00	0.00	4.24	0.01	0.00
11.54	2.00	0.00	4.23	0.01	0.00	11.55	2.00	0.00	4.22	0.01	0.00
11.56	2.00	0.00	4.22	0.01	0.00	11.57	2.00	0.00	4.22	0.01	0.00
11.58	2.00	0.00	4.21	0.01	0.00	11.59	2.00	0.00	4.21	0.01	0.00
11.60	2.00	0.00	4.20	0.01	0.00	11.61	2.00	0.00	4.20	0.01	0.00
11.62	2.00	0.00	4.19	0.01	0.00	11.63	2.00	0.00	4.18	0.01	0.00
11.64	2.00	0.00	4.18	0.01	0.00	11.65	2.00	0.00	4.18	0.01	0.00
11.66	2.00	0.00	4.17	0.01	0.00	11.67	2.00	0.00	4.17	0.01	0.00
11.68	2.00	0.00	4.16	0.01	0.00	11.69	2.00	0.00	4.16	0.01	0.00
11.70	2.00	0.00	4.15	0.01	0.00	11.71	2.00	0.00	4.14	0.01	0.00

**:: Liquefaction Potential Index calculation data :: (continued)**

Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
11.72	2.00	0.00	4.14	0.01	0.00	11.73	2.00	0.00	4.14	0.01	0.00
11.74	2.00	0.00	4.13	0.01	0.00	11.75	2.00	0.00	4.13	0.01	0.00
11.76	2.00	0.00	4.12	0.01	0.00	11.77	2.00	0.00	4.12	0.01	0.00
11.78	2.00	0.00	4.11	0.01	0.00	11.79	2.00	0.00	4.11	0.01	0.00
11.80	2.00	0.00	4.10	0.01	0.00	11.81	2.00	0.00	4.10	0.01	0.00
11.82	2.00	0.00	4.09	0.01	0.00	11.83	2.00	0.00	4.09	0.01	0.00
11.84	2.00	0.00	4.08	0.01	0.00	11.85	2.00	0.00	4.08	0.01	0.00
11.86	2.00	0.00	4.07	0.01	0.00	11.87	2.00	0.00	4.07	0.01	0.00
11.88	2.00	0.00	4.06	0.01	0.00	11.89	2.00	0.00	4.06	0.01	0.00
11.90	2.00	0.00	4.05	0.01	0.00	11.91	2.00	0.00	4.05	0.01	0.00
11.92	2.00	0.00	4.04	0.01	0.00	11.93	2.00	0.00	4.04	0.01	0.00
11.94	2.00	0.00	4.03	0.01	0.00	11.95	2.00	0.00	4.03	0.01	0.00
11.96	2.00	0.00	4.02	0.01	0.00	11.97	2.00	0.00	4.02	0.01	0.00
11.98	2.00	0.00	4.01	0.01	0.00	11.99	2.00	0.00	4.01	0.01	0.00
12.00	2.00	0.00	4.00	0.01	0.00	12.01	2.00	0.00	4.00	0.01	0.00
12.02	2.00	0.00	3.99	0.01	0.00	12.03	2.00	0.00	3.99	0.01	0.00
12.04	2.00	0.00	3.98	0.01	0.00	12.05	2.00	0.00	3.98	0.01	0.00
12.06	2.00	0.00	3.97	0.01	0.00	12.07	2.00	0.00	3.97	0.01	0.00
12.08	2.00	0.00	3.96	0.01	0.00	12.09	2.00	0.00	3.96	0.01	0.00
12.10	2.00	0.00	3.95	0.01	0.00	12.11	2.00	0.00	3.95	0.01	0.00
12.12	2.00	0.00	3.94	0.01	0.00	12.13	2.00	0.00	3.94	0.01	0.00
12.14	2.00	0.00	3.93	0.01	0.00	12.15	2.00	0.00	3.93	0.01	0.00
12.16	2.00	0.00	3.92	0.01	0.00	12.17	2.00	0.00	3.92	0.01	0.00
12.18	2.00	0.00	3.91	0.01	0.00	12.19	2.00	0.00	3.91	0.01	0.00
12.20	2.00	0.00	3.90	0.01	0.00	12.21	2.00	0.00	3.90	0.01	0.00
12.22	2.00	0.00	3.89	0.01	0.00	12.23	2.00	0.00	3.89	0.01	0.00
12.24	2.00	0.00	3.88	0.01	0.00	12.25	2.00	0.00	3.88	0.01	0.00
12.26	2.00	0.00	3.87	0.01	0.00	12.27	2.00	0.00	3.87	0.01	0.00
12.28	2.00	0.00	3.86	0.01	0.00	12.29	2.00	0.00	3.86	0.01	0.00
12.30	2.00	0.00	3.85	0.01	0.00	12.31	2.00	0.00	3.85	0.01	0.00
12.32	2.00	0.00	3.84	0.01	0.00	12.33	2.00	0.00	3.84	0.01	0.00
12.34	2.00	0.00	3.83	0.01	0.00	12.35	2.00	0.00	3.83	0.01	0.00
12.36	2.00	0.00	3.82	0.01	0.00	12.37	2.00	0.00	3.82	0.01	0.00
12.38	2.00	0.00	3.81	0.01	0.00	12.39	2.00	0.00	3.81	0.01	0.00
12.40	2.00	0.00	3.80	0.01	0.00	12.41	2.00	0.00	3.80	0.01	0.00
12.42	2.00	0.00	3.79	0.01	0.00	12.43	2.00	0.00	3.79	0.01	0.00
12.44	2.00	0.00	3.78	0.01	0.00	12.45	2.00	0.00	3.78	0.01	0.00
12.46	2.00	0.00	3.77	0.01	0.00	12.47	2.00	0.00	3.77	0.01	0.00
12.48	2.00	0.00	3.76	0.01	0.00	12.49	2.00	0.00	3.76	0.01	0.00
12.50	2.00	0.00	3.75	0.01	0.00	12.51	2.00	0.00	3.75	0.01	0.00
12.52	2.00	0.00	3.74	0.01	0.00	12.53	2.00	0.00	3.74	0.01	0.00
12.54	2.00	0.00	3.73	0.01	0.00	12.55	2.00	0.00	3.73	0.01	0.00
12.56	2.00	0.00	3.72	0.01	0.00	12.57	2.00	0.00	3.72	0.01	0.00
12.58	2.00	0.00	3.71	0.01	0.00	12.59	2.00	0.00	3.71	0.01	0.00
12.60	2.00	0.00	3.70	0.01	0.00	12.61	2.00	0.00	3.70	0.01	0.00
12.62	2.00	0.00	3.69	0.01	0.00	12.63	2.00	0.00	3.69	0.01	0.00
12.64	2.00	0.00	3.68	0.01	0.00	12.65	2.00	0.00	3.68	0.01	0.00
12.66	2.00	0.00	3.67	0.01	0.00	12.67	2.00	0.00	3.67	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
12.68	2.00	0.00	3.66	0.01	0.00	12.69	2.00	0.00	3.66	0.01	0.00
12.70	2.00	0.00	3.65	0.01	0.00	12.71	2.00	0.00	3.65	0.01	0.00
12.72	2.00	0.00	3.64	0.01	0.00	12.73	2.00	0.00	3.64	0.01	0.00
12.74	2.00	0.00	3.63	0.01	0.00	12.75	2.00	0.00	3.63	0.01	0.00
12.76	2.00	0.00	3.62	0.01	0.00	12.77	2.00	0.00	3.62	0.01	0.00
12.78	2.00	0.00	3.61	0.01	0.00	12.79	2.00	0.00	3.61	0.01	0.00
12.80	2.00	0.00	3.60	0.01	0.00	12.81	2.00	0.00	3.60	0.01	0.00
12.82	2.00	0.00	3.59	0.01	0.00	12.83	2.00	0.00	3.59	0.01	0.00
12.84	2.00	0.00	3.58	0.01	0.00	12.85	2.00	0.00	3.58	0.01	0.00
12.86	2.00	0.00	3.57	0.01	0.00	12.87	2.00	0.00	3.57	0.01	0.00
12.88	2.00	0.00	3.56	0.01	0.00	12.89	2.00	0.00	3.56	0.01	0.00
12.90	2.00	0.00	3.55	0.01	0.00	12.91	2.00	0.00	3.55	0.01	0.00
12.92	2.00	0.00	3.54	0.01	0.00	12.93	2.00	0.00	3.54	0.01	0.00
12.94	2.00	0.00	3.53	0.01	0.00	12.95	2.00	0.00	3.53	0.01	0.00
12.96	2.00	0.00	3.52	0.01	0.00	12.97	2.00	0.00	3.52	0.01	0.00
12.98	2.00	0.00	3.51	0.01	0.00	12.99	2.00	0.00	3.51	0.01	0.00
13.00	2.00	0.00	3.50	0.01	0.00	13.01	2.00	0.00	3.50	0.01	0.00
13.02	2.00	0.00	3.49	0.01	0.00	13.03	2.00	0.00	3.49	0.01	0.00
13.04	2.00	0.00	3.48	0.01	0.00	13.05	2.00	0.00	3.48	0.01	0.00
13.06	2.00	0.00	3.47	0.01	0.00	13.07	2.00	0.00	3.47	0.01	0.00
13.08	2.00	0.00	3.46	0.01	0.00	13.09	2.00	0.00	3.46	0.01	0.00
13.10	2.00	0.00	3.45	0.01	0.00	13.11	2.00	0.00	3.45	0.01	0.00
13.12	2.00	0.00	3.44	0.01	0.00	13.13	2.00	0.00	3.44	0.01	0.00
13.14	2.00	0.00	3.43	0.01	0.00	13.15	2.00	0.00	3.43	0.01	0.00
13.16	2.00	0.00	3.42	0.01	0.00	13.17	2.00	0.00	3.42	0.01	0.00
13.18	2.00	0.00	3.41	0.01	0.00	13.19	2.00	0.00	3.41	0.01	0.00
13.20	2.00	0.00	3.40	0.01	0.00	13.21	2.00	0.00	3.40	0.01	0.00
13.22	2.00	0.00	3.39	0.01	0.00	13.23	2.00	0.00	3.39	0.01	0.00
13.24	2.00	0.00	3.38	0.01	0.00	13.25	2.00	0.00	3.38	0.01	0.00
13.26	2.00	0.00	3.37	0.01	0.00	13.27	2.00	0.00	3.37	0.01	0.00
13.28	2.00	0.00	3.36	0.01	0.00	13.29	2.00	0.00	3.36	0.01	0.00
13.30	2.00	0.00	3.35	0.01	0.00	13.31	2.00	0.00	3.35	0.01	0.00
13.32	2.00	0.00	3.34	0.01	0.00	13.33	2.00	0.00	3.34	0.01	0.00
13.34	2.00	0.00	3.33	0.01	0.00	13.35	2.00	0.00	3.33	0.01	0.00
13.36	2.00	0.00	3.32	0.01	0.00	13.37	2.00	0.00	3.32	0.01	0.00
13.38	2.00	0.00	3.31	0.01	0.00	13.39	2.00	0.00	3.31	0.01	0.00
13.40	2.00	0.00	3.30	0.01	0.00	13.41	2.00	0.00	3.30	0.01	0.00
13.42	2.00	0.00	3.29	0.01	0.00	13.43	2.00	0.00	3.29	0.01	0.00
13.44	2.00	0.00	3.28	0.01	0.00	13.45	2.00	0.00	3.28	0.01	0.00
13.46	2.00	0.00	3.27	0.01	0.00	13.47	2.00	0.00	3.27	0.01	0.00
13.48	2.00	0.00	3.26	0.01	0.00	13.49	2.00	0.00	3.26	0.01	0.00
13.50	2.00	0.00	3.25	0.01	0.00	13.51	2.00	0.00	3.25	0.01	0.00
13.52	2.00	0.00	3.24	0.01	0.00	13.53	2.00	0.00	3.24	0.01	0.00
13.54	2.00	0.00	3.23	0.01	0.00	13.55	2.00	0.00	3.23	0.01	0.00
13.56	2.00	0.00	3.22	0.01	0.00	13.57	2.00	0.00	3.22	0.01	0.00
13.58	2.00	0.00	3.21	0.01	0.00	13.59	2.00	0.00	3.21	0.01	0.00
13.60	2.00	0.00	3.20	0.01	0.00	13.61	2.00	0.00	3.20	0.01	0.00
13.62	2.00	0.00	3.19	0.01	0.00	13.63	2.00	0.00	3.19	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
13.64	2.00	0.00	3.18	0.01	0.00	13.65	2.00	0.00	3.18	0.01	0.00
13.66	2.00	0.00	3.17	0.01	0.00	13.67	2.00	0.00	3.17	0.01	0.00
13.68	2.00	0.00	3.16	0.01	0.00	13.69	2.00	0.00	3.16	0.01	0.00
13.70	2.00	0.00	3.15	0.01	0.00	13.71	2.00	0.00	3.15	0.01	0.00
13.72	2.00	0.00	3.14	0.01	0.00	13.73	2.00	0.00	3.14	0.01	0.00
13.74	2.00	0.00	3.13	0.01	0.00	13.75	2.00	0.00	3.13	0.01	0.00
13.76	2.00	0.00	3.12	0.01	0.00	13.77	2.00	0.00	3.12	0.01	0.00
13.78	2.00	0.00	3.11	0.01	0.00	13.79	2.00	0.00	3.11	0.01	0.00
13.80	2.00	0.00	3.10	0.01	0.00	13.81	2.00	0.00	3.10	0.01	0.00
13.82	2.00	0.00	3.09	0.01	0.00	13.83	2.00	0.00	3.09	0.01	0.00
13.84	2.00	0.00	3.08	0.01	0.00	13.85	2.00	0.00	3.08	0.01	0.00
13.86	2.00	0.00	3.07	0.01	0.00	13.87	2.00	0.00	3.07	0.01	0.00
13.88	2.00	0.00	3.06	0.01	0.00	13.89	2.00	0.00	3.06	0.01	0.00
13.90	2.00	0.00	3.05	0.01	0.00	13.91	2.00	0.00	3.05	0.01	0.00
13.92	2.00	0.00	3.04	0.01	0.00	13.93	2.00	0.00	3.04	0.01	0.00
13.94	2.00	0.00	3.03	0.01	0.00	13.95	2.00	0.00	3.03	0.01	0.00
13.96	2.00	0.00	3.02	0.01	0.00	13.97	2.00	0.00	3.02	0.01	0.00
13.98	2.00	0.00	3.01	0.01	0.00	13.99	2.00	0.00	3.01	0.01	0.00
14.00	2.00	0.00	3.00	0.01	0.00	14.01	2.00	0.00	3.00	0.01	0.00
14.02	2.00	0.00	2.99	0.01	0.00	14.03	2.00	0.00	2.99	0.01	0.00
14.04	2.00	0.00	2.98	0.01	0.00	14.05	2.00	0.00	2.98	0.01	0.00
14.06	2.00	0.00	2.97	0.01	0.00	14.07	2.00	0.00	2.97	0.01	0.00
14.08	2.00	0.00	2.96	0.01	0.00	14.09	2.00	0.00	2.96	0.01	0.00
14.10	2.00	0.00	2.95	0.01	0.00	14.11	2.00	0.00	2.95	0.01	0.00
14.12	2.00	0.00	2.94	0.01	0.00	14.13	2.00	0.00	2.94	0.01	0.00
14.14	2.00	0.00	2.93	0.01	0.00	14.15	2.00	0.00	2.93	0.01	0.00
14.16	2.00	0.00	2.92	0.01	0.00	14.17	2.00	0.00	2.92	0.01	0.00
14.18	2.00	0.00	2.91	0.01	0.00	14.19	2.00	0.00	2.91	0.01	0.00
14.20	2.00	0.00	2.90	0.01	0.00	14.21	2.00	0.00	2.90	0.01	0.00
14.22	2.00	0.00	2.89	0.01	0.00	14.23	2.00	0.00	2.89	0.01	0.00
14.24	2.00	0.00	2.88	0.01	0.00	14.25	2.00	0.00	2.88	0.01	0.00
14.26	2.00	0.00	2.87	0.01	0.00	14.27	2.00	0.00	2.87	0.01	0.00
14.28	2.00	0.00	2.86	0.01	0.00	14.29	2.00	0.00	2.86	0.01	0.00
14.30	2.00	0.00	2.85	0.01	0.00	14.31	2.00	0.00	2.85	0.01	0.00
14.32	2.00	0.00	2.84	0.01	0.00	14.33	0.53	0.47	2.84	0.01	0.01
14.34	0.53	0.47	2.83	0.01	0.01	14.35	0.54	0.46	2.83	0.01	0.01
14.36	0.54	0.46	2.82	0.01	0.01	14.37	2.00	0.00	2.82	0.01	0.00
14.38	2.00	0.00	2.81	0.01	0.00	14.39	2.00	0.00	2.81	0.01	0.00
14.40	2.00	0.00	2.80	0.01	0.00	14.41	2.00	0.00	2.80	0.01	0.00
14.42	2.00	0.00	2.79	0.01	0.00	14.43	2.00	0.00	2.79	0.01	0.00
14.44	2.00	0.00	2.78	0.01	0.00	14.45	2.00	0.00	2.78	0.01	0.00
14.46	2.00	0.00	2.77	0.01	0.00	14.47	2.00	0.00	2.77	0.01	0.00
14.48	2.00	0.00	2.76	0.01	0.00	14.49	2.00	0.00	2.76	0.01	0.00
14.50	2.00	0.00	2.75	0.01	0.00	14.51	2.00	0.00	2.75	0.01	0.00
14.52	2.00	0.00	2.74	0.01	0.00	14.53	2.00	0.00	2.74	0.01	0.00
14.54	2.00	0.00	2.73	0.01	0.00	14.55	2.00	0.00	2.73	0.01	0.00
14.56	2.00	0.00	2.72	0.01	0.00	14.57	2.00	0.00	2.72	0.01	0.00
14.58	2.00	0.00	2.71	0.01	0.00	14.59	2.00	0.00	2.71	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
14.60	2.00	0.00	2.70	0.01	0.00	14.61	2.00	0.00	2.70	0.01	0.00
14.62	2.00	0.00	2.69	0.01	0.00	14.63	2.00	0.00	2.69	0.01	0.00
14.64	2.00	0.00	2.68	0.01	0.00	14.65	2.00	0.00	2.67	0.01	0.00
14.66	2.00	0.00	2.67	0.01	0.00	14.67	2.00	0.00	2.67	0.01	0.00
14.68	2.00	0.00	2.66	0.01	0.00	14.69	2.00	0.00	2.65	0.01	0.00
14.70	2.00	0.00	2.65	0.01	0.00	14.71	2.00	0.00	2.65	0.01	0.00
14.72	2.00	0.00	2.64	0.01	0.00	14.73	2.00	0.00	2.63	0.01	0.00
14.74	2.00	0.00	2.63	0.01	0.00	14.75	2.00	0.00	2.63	0.01	0.00
14.76	2.00	0.00	2.62	0.01	0.00	14.77	2.00	0.00	2.62	0.01	0.00
14.78	2.00	0.00	2.61	0.01	0.00	14.79	2.00	0.00	2.61	0.01	0.00
14.80	2.00	0.00	2.60	0.01	0.00	14.81	2.00	0.00	2.60	0.01	0.00
14.82	2.00	0.00	2.59	0.01	0.00	14.83	2.00	0.00	2.59	0.01	0.00
14.84	2.00	0.00	2.58	0.01	0.00	14.85	2.00	0.00	2.58	0.01	0.00
14.86	2.00	0.00	2.57	0.01	0.00	14.87	2.00	0.00	2.57	0.01	0.00
14.88	2.00	0.00	2.56	0.01	0.00	14.89	2.00	0.00	2.56	0.01	0.00
14.90	2.00	0.00	2.55	0.01	0.00	14.91	2.00	0.00	2.55	0.01	0.00
14.92	2.00	0.00	2.54	0.01	0.00	14.93	2.00	0.00	2.54	0.01	0.00
14.94	2.00	0.00	2.53	0.01	0.00	14.95	2.00	0.00	2.53	0.01	0.00
14.96	2.00	0.00	2.52	0.01	0.00	14.97	2.00	0.00	2.52	0.01	0.00
14.98	2.00	0.00	2.51	0.01	0.00	14.99	2.00	0.00	2.51	0.01	0.00
15.00	2.00	0.00	2.50	0.01	0.00	15.01	2.00	0.00	2.50	0.01	0.00
15.02	2.00	0.00	2.49	0.01	0.00	15.03	2.00	0.00	2.49	0.01	0.00
15.04	2.00	0.00	2.48	0.01	0.00	15.05	2.00	0.00	2.48	0.01	0.00
15.06	2.00	0.00	2.47	0.01	0.00	15.07	2.00	0.00	2.47	0.01	0.00
15.08	2.00	0.00	2.46	0.01	0.00	15.09	2.00	0.00	2.46	0.01	0.00
15.10	2.00	0.00	2.45	0.01	0.00	15.11	2.00	0.00	2.45	0.01	0.00
15.12	2.00	0.00	2.44	0.01	0.00	15.13	2.00	0.00	2.44	0.01	0.00
15.14	2.00	0.00	2.43	0.01	0.00	15.15	2.00	0.00	2.42	0.01	0.00
15.16	2.00	0.00	2.42	0.01	0.00	15.17	2.00	0.00	2.42	0.01	0.00
15.18	2.00	0.00	2.41	0.01	0.00	15.19	2.00	0.00	2.40	0.01	0.00
15.20	2.00	0.00	2.40	0.01	0.00	15.21	2.00	0.00	2.40	0.01	0.00
15.22	2.00	0.00	2.39	0.01	0.00	15.23	2.00	0.00	2.38	0.01	0.00
15.24	2.00	0.00	2.38	0.01	0.00	15.25	2.00	0.00	2.38	0.01	0.00
15.26	2.00	0.00	2.37	0.01	0.00	15.27	2.00	0.00	2.37	0.01	0.00
15.28	2.00	0.00	2.36	0.01	0.00	15.29	2.00	0.00	2.36	0.01	0.00
15.30	2.00	0.00	2.35	0.01	0.00	15.31	2.00	0.00	2.35	0.01	0.00
15.32	2.00	0.00	2.34	0.01	0.00	15.33	2.00	0.00	2.34	0.01	0.00
15.34	2.00	0.00	2.33	0.01	0.00	15.35	2.00	0.00	2.33	0.01	0.00
15.36	2.00	0.00	2.32	0.01	0.00	15.37	2.00	0.00	2.32	0.01	0.00
15.38	2.00	0.00	2.31	0.01	0.00	15.39	2.00	0.00	2.31	0.01	0.00
15.40	2.00	0.00	2.30	0.01	0.00	15.41	2.00	0.00	2.30	0.01	0.00
15.42	2.00	0.00	2.29	0.01	0.00	15.43	0.69	0.31	2.29	0.01	0.01
15.44	0.69	0.31	2.28	0.01	0.01	15.45	0.70	0.30	2.28	0.01	0.01
15.46	0.70	0.30	2.27	0.01	0.01	15.47	0.71	0.29	2.27	0.01	0.01
15.48	0.71	0.29	2.26	0.01	0.01	15.49	2.00	0.00	2.26	0.01	0.00
15.50	0.72	0.28	2.25	0.01	0.01	15.51	0.73	0.27	2.25	0.01	0.01
15.52	0.73	0.27	2.24	0.01	0.01	15.53	0.74	0.26	2.24	0.01	0.01
15.54	0.74	0.26	2.23	0.01	0.01	15.55	0.74	0.26	2.23	0.01	0.01

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
15.56	0.74	0.26	2.22	0.01	0.01	15.57	0.74	0.26	2.22	0.01	0.01
15.58	0.73	0.27	2.21	0.01	0.01	15.59	0.73	0.27	2.21	0.01	0.01
15.60	0.73	0.27	2.20	0.01	0.01	15.61	0.73	0.27	2.20	0.01	0.01
15.62	0.73	0.27	2.19	0.01	0.01	15.63	0.74	0.26	2.19	0.01	0.01
15.64	0.74	0.26	2.18	0.01	0.01	15.65	0.74	0.26	2.17	0.01	0.01
15.66	0.75	0.25	2.17	0.01	0.01	15.67	0.76	0.24	2.17	0.01	0.01
15.68	0.76	0.24	2.16	0.01	0.01	15.69	0.76	0.24	2.15	0.01	0.01
15.70	0.76	0.24	2.15	0.01	0.01	15.71	0.76	0.24	2.15	0.01	0.01
15.72	0.76	0.24	2.14	0.01	0.01	15.73	0.76	0.24	2.13	0.01	0.01
15.74	0.75	0.25	2.13	0.01	0.01	15.75	0.76	0.24	2.13	0.01	0.01
15.76	0.75	0.25	2.12	0.01	0.01	15.77	0.75	0.25	2.12	0.01	0.01
15.78	0.75	0.25	2.11	0.01	0.01	15.79	0.75	0.25	2.11	0.01	0.01
15.80	0.75	0.25	2.10	0.01	0.01	15.81	0.75	0.25	2.10	0.01	0.01
15.82	0.73	0.27	2.09	0.01	0.01	15.83	0.73	0.27	2.09	0.01	0.01
15.84	0.73	0.27	2.08	0.01	0.01	15.85	2.00	0.00	2.08	0.01	0.00
15.86	2.00	0.00	2.07	0.01	0.00	15.87	2.00	0.00	2.07	0.01	0.00
15.88	2.00	0.00	2.06	0.01	0.00	15.89	2.00	0.00	2.06	0.01	0.00
15.90	2.00	0.00	2.05	0.01	0.00	15.91	2.00	0.00	2.05	0.01	0.00
15.92	2.00	0.00	2.04	0.01	0.00	15.93	2.00	0.00	2.04	0.01	0.00
15.94	2.00	0.00	2.03	0.01	0.00	15.95	2.00	0.00	2.03	0.01	0.00
15.96	2.00	0.00	2.02	0.01	0.00	15.97	2.00	0.00	2.02	0.01	0.00
15.98	2.00	0.00	2.01	0.01	0.00	15.99	2.00	0.00	2.01	0.01	0.00
16.00	2.00	0.00	2.00	0.01	0.00	16.01	2.00	0.00	2.00	0.01	0.00
16.02	2.00	0.00	1.99	0.01	0.00	16.03	2.00	0.00	1.99	0.01	0.00
16.04	0.71	0.29	1.98	0.01	0.01	16.05	0.72	0.28	1.98	0.01	0.01
16.06	0.72	0.28	1.97	0.01	0.01	16.07	0.73	0.27	1.97	0.01	0.01
16.08	0.73	0.27	1.96	0.01	0.01	16.09	0.73	0.27	1.96	0.01	0.01
16.10	0.73	0.27	1.95	0.01	0.01	16.11	0.72	0.28	1.95	0.01	0.01
16.12	0.72	0.28	1.94	0.01	0.01	16.13	0.71	0.29	1.94	0.01	0.01
16.14	2.00	0.00	1.93	0.01	0.00	16.15	2.00	0.00	1.93	0.01	0.00
16.16	2.00	0.00	1.92	0.01	0.00	16.17	2.00	0.00	1.92	0.01	0.00
16.18	2.00	0.00	1.91	0.01	0.00	16.19	0.73	0.27	1.91	0.01	0.01
16.20	0.77	0.23	1.90	0.01	0.00	16.21	0.79	0.21	1.90	0.01	0.00
16.22	0.84	0.16	1.89	0.01	0.00	16.23	0.87	0.13	1.89	0.01	0.00
16.24	0.93	0.07	1.88	0.01	0.00	16.25	0.92	0.08	1.88	0.01	0.00
16.26	0.98	0.02	1.87	0.01	0.00	16.27	1.00	0.00	1.87	0.01	0.00
16.28	1.05	0.00	1.86	0.01	0.00	16.29	1.07	0.00	1.86	0.01	0.00
16.30	1.09	0.00	1.85	0.01	0.00	16.31	1.07	0.00	1.85	0.01	0.00
16.32	1.06	0.00	1.84	0.01	0.00	16.33	1.05	0.00	1.84	0.01	0.00
16.34	1.03	0.00	1.83	0.01	0.00	16.35	1.05	0.00	1.83	0.01	0.00
16.36	1.06	0.00	1.82	0.01	0.00	16.37	1.08	0.00	1.82	0.01	0.00
16.38	1.13	0.00	1.81	0.01	0.00	16.39	1.09	0.00	1.81	0.01	0.00
16.40	1.26	0.00	1.80	0.01	0.00	16.41	1.35	0.00	1.80	0.01	0.00
16.42	1.37	0.00	1.79	0.01	0.00	16.43	1.42	0.00	1.79	0.01	0.00
16.44	1.60	0.00	1.78	0.01	0.00	16.45	1.60	0.00	1.78	0.01	0.00
16.46	1.73	0.00	1.77	0.01	0.00	16.47	1.70	0.00	1.77	0.01	0.00
16.48	1.77	0.00	1.76	0.01	0.00	16.49	1.76	0.00	1.76	0.01	0.00
16.50	1.64	0.00	1.75	0.01	0.00	16.51	1.50	0.00	1.75	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
16.52	1.29	0.00	1.74	0.01	0.00	16.53	1.15	0.00	1.74	0.01	0.00
16.54	1.10	0.00	1.73	0.01	0.00	16.55	1.18	0.00	1.73	0.01	0.00
16.56	1.16	0.00	1.72	0.01	0.00	16.57	1.26	0.00	1.72	0.01	0.00
16.58	1.03	0.00	1.71	0.01	0.00	16.59	0.98	0.02	1.71	0.01	0.00
16.60	0.91	0.09	1.70	0.01	0.00	16.61	0.83	0.17	1.70	0.01	0.00
16.62	0.71	0.29	1.69	0.01	0.00	16.63	0.68	0.32	1.69	0.01	0.01
16.64	2.00	0.00	1.68	0.01	0.00	16.65	2.00	0.00	1.68	0.01	0.00
16.66	2.00	0.00	1.67	0.01	0.00	16.67	2.00	0.00	1.67	0.01	0.00
16.68	2.00	0.00	1.66	0.01	0.00	16.69	2.00	0.00	1.66	0.01	0.00
16.70	2.00	0.00	1.65	0.01	0.00	16.71	2.00	0.00	1.65	0.01	0.00
16.72	2.00	0.00	1.64	0.01	0.00	16.73	2.00	0.00	1.64	0.01	0.00
16.74	2.00	0.00	1.63	0.01	0.00	16.75	2.00	0.00	1.63	0.01	0.00
16.76	2.00	0.00	1.62	0.01	0.00	16.77	2.00	0.00	1.62	0.01	0.00
16.78	2.00	0.00	1.61	0.01	0.00	16.79	2.00	0.00	1.61	0.01	0.00
16.80	2.00	0.00	1.60	0.01	0.00	16.81	2.00	0.00	1.60	0.01	0.00
16.82	2.00	0.00	1.59	0.01	0.00	16.83	2.00	0.00	1.59	0.01	0.00
16.84	2.00	0.00	1.58	0.01	0.00	16.85	2.00	0.00	1.58	0.01	0.00
16.86	2.00	0.00	1.57	0.01	0.00	16.87	2.00	0.00	1.57	0.01	0.00
16.88	2.00	0.00	1.56	0.01	0.00	16.89	2.00	0.00	1.56	0.01	0.00
16.90	2.00	0.00	1.55	0.01	0.00	16.91	2.00	0.00	1.55	0.01	0.00
16.92	2.00	0.00	1.54	0.01	0.00	16.93	2.00	0.00	1.54	0.01	0.00
16.94	2.00	0.00	1.53	0.01	0.00	16.95	2.00	0.00	1.53	0.01	0.00
16.96	2.00	0.00	1.52	0.01	0.00	16.97	2.00	0.00	1.52	0.01	0.00
16.98	2.00	0.00	1.51	0.01	0.00	16.99	2.00	0.00	1.51	0.01	0.00
17.00	2.00	0.00	1.50	0.01	0.00	17.01	2.00	0.00	1.50	0.01	0.00
17.02	2.00	0.00	1.49	0.01	0.00	17.03	2.00	0.00	1.49	0.01	0.00
17.04	2.00	0.00	1.48	0.01	0.00	17.05	2.00	0.00	1.48	0.01	0.00
17.06	2.00	0.00	1.47	0.01	0.00	17.07	2.00	0.00	1.47	0.01	0.00
17.08	2.00	0.00	1.46	0.01	0.00	17.09	2.00	0.00	1.46	0.01	0.00
17.10	2.00	0.00	1.45	0.01	0.00	17.11	2.00	0.00	1.45	0.01	0.00
17.12	2.00	0.00	1.44	0.01	0.00	17.13	2.00	0.00	1.44	0.01	0.00
17.14	2.00	0.00	1.43	0.01	0.00	17.15	2.00	0.00	1.43	0.01	0.00
17.16	2.00	0.00	1.42	0.01	0.00	17.17	2.00	0.00	1.42	0.01	0.00
17.18	2.00	0.00	1.41	0.01	0.00	17.19	2.00	0.00	1.41	0.01	0.00
17.20	2.00	0.00	1.40	0.01	0.00	17.21	2.00	0.00	1.40	0.01	0.00
17.22	2.00	0.00	1.39	0.01	0.00	17.23	2.00	0.00	1.39	0.01	0.00
17.24	2.00	0.00	1.38	0.01	0.00	17.25	2.00	0.00	1.38	0.01	0.00
17.26	2.00	0.00	1.37	0.01	0.00	17.27	2.00	0.00	1.37	0.01	0.00
17.28	2.00	0.00	1.36	0.01	0.00	17.29	2.00	0.00	1.36	0.01	0.00
17.30	2.00	0.00	1.35	0.01	0.00	17.31	2.00	0.00	1.35	0.01	0.00
17.32	2.00	0.00	1.34	0.01	0.00	17.33	2.00	0.00	1.34	0.01	0.00
17.34	2.00	0.00	1.33	0.01	0.00	17.35	2.00	0.00	1.33	0.01	0.00
17.36	2.00	0.00	1.32	0.01	0.00	17.37	2.00	0.00	1.32	0.01	0.00
17.38	2.00	0.00	1.31	0.01	0.00	17.39	2.00	0.00	1.31	0.01	0.00
17.40	2.00	0.00	1.30	0.01	0.00	17.41	2.00	0.00	1.30	0.01	0.00
17.42	2.00	0.00	1.29	0.01	0.00	17.43	2.00	0.00	1.29	0.01	0.00
17.44	2.00	0.00	1.28	0.01	0.00	17.45	2.00	0.00	1.27	0.01	0.00
17.46	2.00	0.00	1.27	0.01	0.00	17.47	2.00	0.00	1.26	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
17.48	2.00	0.00	1.26	0.01	0.00	17.49	2.00	0.00	1.25	0.01	0.00
17.50	2.00	0.00	1.25	0.01	0.00	17.51	2.00	0.00	1.25	0.01	0.00
17.52	2.00	0.00	1.24	0.01	0.00	17.53	2.00	0.00	1.24	0.01	0.00
17.54	2.00	0.00	1.23	0.01	0.00	17.55	2.00	0.00	1.23	0.01	0.00
17.56	2.00	0.00	1.22	0.01	0.00	17.57	2.00	0.00	1.22	0.01	0.00
17.58	2.00	0.00	1.21	0.01	0.00	17.59	2.00	0.00	1.21	0.01	0.00
17.60	2.00	0.00	1.20	0.01	0.00	17.61	2.00	0.00	1.20	0.01	0.00
17.62	2.00	0.00	1.19	0.01	0.00	17.63	2.00	0.00	1.19	0.01	0.00
17.64	2.00	0.00	1.18	0.01	0.00	17.65	2.00	0.00	1.18	0.01	0.00
17.66	2.00	0.00	1.17	0.01	0.00	17.67	2.00	0.00	1.17	0.01	0.00
17.68	2.00	0.00	1.16	0.01	0.00	17.69	2.00	0.00	1.16	0.01	0.00
17.70	2.00	0.00	1.15	0.01	0.00	17.71	2.00	0.00	1.15	0.01	0.00
17.72	2.00	0.00	1.14	0.01	0.00	17.73	2.00	0.00	1.14	0.01	0.00
17.74	2.00	0.00	1.13	0.01	0.00	17.75	2.00	0.00	1.13	0.01	0.00
17.76	2.00	0.00	1.12	0.01	0.00	17.77	2.00	0.00	1.12	0.01	0.00
17.78	2.00	0.00	1.11	0.01	0.00	17.79	2.00	0.00	1.11	0.01	0.00
17.80	2.00	0.00	1.10	0.01	0.00	17.81	2.00	0.00	1.10	0.01	0.00
17.82	2.00	0.00	1.09	0.01	0.00	17.83	2.00	0.00	1.09	0.01	0.00
17.84	2.00	0.00	1.08	0.01	0.00	17.85	2.00	0.00	1.08	0.01	0.00
17.86	2.00	0.00	1.07	0.01	0.00	17.87	2.00	0.00	1.07	0.01	0.00
17.88	2.00	0.00	1.06	0.01	0.00	17.89	2.00	0.00	1.06	0.01	0.00
17.90	2.00	0.00	1.05	0.01	0.00	17.91	2.00	0.00	1.05	0.01	0.00
17.92	2.00	0.00	1.04	0.01	0.00	17.93	2.00	0.00	1.04	0.01	0.00
17.94	2.00	0.00	1.03	0.01	0.00	17.95	2.00	0.00	1.02	0.01	0.00
17.96	2.00	0.00	1.02	0.01	0.00	17.97	2.00	0.00	1.01	0.01	0.00
17.98	2.00	0.00	1.01	0.01	0.00	17.99	2.00	0.00	1.00	0.01	0.00
18.00	2.00	0.00	1.00	0.01	0.00	18.01	2.00	0.00	0.99	0.01	0.00
18.02	2.00	0.00	0.99	0.01	0.00	18.03	2.00	0.00	0.98	0.01	0.00
18.04	2.00	0.00	0.98	0.01	0.00	18.05	2.00	0.00	0.98	0.01	0.00
18.06	2.00	0.00	0.97	0.01	0.00	18.07	2.00	0.00	0.97	0.01	0.00
18.08	2.00	0.00	0.96	0.01	0.00	18.09	2.00	0.00	0.96	0.01	0.00
18.10	2.00	0.00	0.95	0.01	0.00	18.11	2.00	0.00	0.95	0.01	0.00
18.12	2.00	0.00	0.94	0.01	0.00	18.13	2.00	0.00	0.94	0.01	0.00
18.14	2.00	0.00	0.93	0.01	0.00	18.15	2.00	0.00	0.93	0.01	0.00
18.16	2.00	0.00	0.92	0.01	0.00	18.17	2.00	0.00	0.91	0.01	0.00
18.18	2.00	0.00	0.91	0.01	0.00	18.19	2.00	0.00	0.90	0.01	0.00
18.20	2.00	0.00	0.90	0.01	0.00	18.21	2.00	0.00	0.90	0.01	0.00
18.22	2.00	0.00	0.89	0.01	0.00	18.23	2.00	0.00	0.89	0.01	0.00
18.24	2.00	0.00	0.88	0.01	0.00	18.25	2.00	0.00	0.88	0.01	0.00
18.26	2.00	0.00	0.87	0.01	0.00	18.27	2.00	0.00	0.87	0.01	0.00
18.28	2.00	0.00	0.86	0.01	0.00	18.29	2.00	0.00	0.86	0.01	0.00
18.30	2.00	0.00	0.85	0.01	0.00	18.31	2.00	0.00	0.85	0.01	0.00
18.32	2.00	0.00	0.84	0.01	0.00	18.33	2.00	0.00	0.84	0.01	0.00
18.34	2.00	0.00	0.83	0.01	0.00	18.35	2.00	0.00	0.82	0.01	0.00
18.36	2.00	0.00	0.82	0.01	0.00	18.37	2.00	0.00	0.81	0.01	0.00
18.38	2.00	0.00	0.81	0.01	0.00	18.39	2.00	0.00	0.81	0.01	0.00
18.40	2.00	0.00	0.80	0.01	0.00	18.41	2.00	0.00	0.80	0.01	0.00
18.42	2.00	0.00	0.79	0.01	0.00	18.43	2.00	0.00	0.79	0.01	0.00

**:: Liquefaction Potential Index calculation data :: (continued)**

Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
18.44	2.00	0.00	0.78	0.01	0.00	18.45	2.00	0.00	0.78	0.01	0.00
18.46	2.00	0.00	0.77	0.01	0.00	18.47	2.00	0.00	0.77	0.01	0.00
18.48	2.00	0.00	0.76	0.01	0.00	18.49	2.00	0.00	0.76	0.01	0.00
18.50	2.00	0.00	0.75	0.01	0.00	18.51	2.00	0.00	0.74	0.01	0.00
18.52	2.00	0.00	0.74	0.01	0.00	18.53	2.00	0.00	0.73	0.01	0.00
18.54	2.00	0.00	0.73	0.01	0.00	18.55	2.00	0.00	0.73	0.01	0.00
18.56	2.00	0.00	0.72	0.01	0.00	18.57	2.00	0.00	0.72	0.01	0.00
18.58	2.00	0.00	0.71	0.01	0.00	18.59	2.00	0.00	0.71	0.01	0.00
18.60	2.00	0.00	0.70	0.01	0.00	18.61	2.00	0.00	0.70	0.01	0.00
18.62	2.00	0.00	0.69	0.01	0.00	18.63	2.00	0.00	0.69	0.01	0.00
18.64	2.00	0.00	0.68	0.01	0.00	18.65	2.00	0.00	0.68	0.01	0.00
18.66	2.00	0.00	0.67	0.01	0.00	18.67	2.00	0.00	0.66	0.01	0.00
18.68	2.00	0.00	0.66	0.01	0.00	18.69	2.00	0.00	0.65	0.01	0.00
18.70	2.00	0.00	0.65	0.01	0.00	18.71	2.00	0.00	0.65	0.01	0.00
18.72	2.00	0.00	0.64	0.01	0.00	18.73	2.00	0.00	0.64	0.01	0.00
18.74	2.00	0.00	0.63	0.01	0.00	18.75	2.00	0.00	0.63	0.01	0.00
18.76	2.00	0.00	0.62	0.01	0.00	18.77	2.00	0.00	0.62	0.01	0.00
18.78	2.00	0.00	0.61	0.01	0.00	18.79	2.00	0.00	0.61	0.01	0.00
18.80	2.00	0.00	0.60	0.01	0.00	18.81	2.00	0.00	0.60	0.01	0.00
18.82	2.00	0.00	0.59	0.01	0.00	18.83	2.00	0.00	0.59	0.01	0.00
18.84	2.00	0.00	0.58	0.01	0.00	18.85	2.00	0.00	0.57	0.01	0.00
18.86	2.00	0.00	0.57	0.01	0.00	18.87	2.00	0.00	0.56	0.01	0.00
18.88	2.00	0.00	0.56	0.01	0.00	18.89	2.00	0.00	0.56	0.01	0.00
18.90	2.00	0.00	0.55	0.01	0.00	18.91	2.00	0.00	0.55	0.01	0.00
18.92	2.00	0.00	0.54	0.01	0.00	18.93	2.00	0.00	0.54	0.01	0.00
18.94	2.00	0.00	0.53	0.01	0.00	18.95	2.00	0.00	0.53	0.01	0.00
18.96	2.00	0.00	0.52	0.01	0.00	18.97	2.00	0.00	0.52	0.01	0.00
18.98	2.00	0.00	0.51	0.01	0.00	18.99	2.00	0.00	0.51	0.01	0.00
19.00	2.00	0.00	0.50	0.01	0.00	19.01	2.00	0.00	0.49	0.01	0.00
19.02	2.00	0.00	0.49	0.01	0.00	19.03	2.00	0.00	0.48	0.01	0.00
19.04	2.00	0.00	0.48	0.01	0.00	19.05	2.00	0.00	0.48	0.01	0.00
19.06	2.00	0.00	0.47	0.01	0.00	19.07	2.00	0.00	0.47	0.01	0.00
19.08	2.00	0.00	0.46	0.01	0.00	19.09	2.00	0.00	0.46	0.01	0.00
19.10	2.00	0.00	0.45	0.01	0.00	19.11	2.00	0.00	0.45	0.01	0.00
19.12	2.00	0.00	0.44	0.01	0.00	19.13	2.00	0.00	0.44	0.01	0.00
19.14	2.00	0.00	0.43	0.01	0.00	19.15	2.00	0.00	0.43	0.01	0.00
19.16	2.00	0.00	0.42	0.01	0.00	19.17	2.00	0.00	0.41	0.01	0.00
19.18	2.00	0.00	0.41	0.01	0.00	19.19	2.00	0.00	0.40	0.01	0.00
19.20	2.00	0.00	0.40	0.01	0.00	19.21	2.00	0.00	0.40	0.01	0.00
19.22	2.00	0.00	0.39	0.01	0.00	19.23	2.00	0.00	0.39	0.01	0.00
19.24	2.00	0.00	0.38	0.01	0.00	19.25	2.00	0.00	0.38	0.01	0.00
19.26	2.00	0.00	0.37	0.01	0.00	19.27	2.00	0.00	0.37	0.01	0.00
19.28	2.00	0.00	0.36	0.01	0.00	19.29	2.00	0.00	0.36	0.01	0.00
19.30	2.00	0.00	0.35	0.01	0.00	19.31	2.00	0.00	0.35	0.01	0.00
19.32	2.00	0.00	0.34	0.01	0.00	19.33	2.00	0.00	0.34	0.01	0.00
19.34	2.00	0.00	0.33	0.01	0.00	19.35	2.00	0.00	0.32	0.01	0.00
19.36	2.00	0.00	0.32	0.01	0.00	19.37	2.00	0.00	0.31	0.01	0.00
19.38	2.00	0.00	0.31	0.01	0.00	19.39	2.00	0.00	0.31	0.01	0.00

**:: Liquefaction Potential Index calculation data :: (continued)**

Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
19.40	2.00	0.00	0.30	0.01	0.00	19.41	2.00	0.00	0.30	0.01	0.00
19.42	2.00	0.00	0.29	0.01	0.00	19.43	2.00	0.00	0.28	0.01	0.00
19.44	2.00	0.00	0.28	0.01	0.00	19.45	2.00	0.00	0.28	0.01	0.00
19.46	2.00	0.00	0.27	0.01	0.00	19.47	2.00	0.00	0.27	0.01	0.00
19.48	2.00	0.00	0.26	0.01	0.00	19.49	2.00	0.00	0.26	0.01	0.00
19.50	2.00	0.00	0.25	0.01	0.00	19.51	2.00	0.00	0.24	0.01	0.00
19.52	2.00	0.00	0.24	0.01	0.00	19.53	2.00	0.00	0.23	0.01	0.00
19.54	2.00	0.00	0.23	0.01	0.00	19.55	2.00	0.00	0.23	0.01	0.00
19.56	2.00	0.00	0.22	0.01	0.00	19.57	2.00	0.00	0.22	0.01	0.00
19.58	2.00	0.00	0.21	0.01	0.00	19.59	2.00	0.00	0.21	0.01	0.00
19.60	2.00	0.00	0.20	0.01	0.00	19.61	2.00	0.00	0.20	0.01	0.00
19.62	2.00	0.00	0.19	0.01	0.00	19.63	2.00	0.00	0.19	0.01	0.00
19.64	2.00	0.00	0.18	0.01	0.00	19.65	2.00	0.00	0.18	0.01	0.00
19.66	2.00	0.00	0.17	0.01	0.00	19.67	2.00	0.00	0.16	0.01	0.00
19.68	2.00	0.00	0.16	0.01	0.00	19.69	2.00	0.00	0.15	0.01	0.00
19.70	2.00	0.00	0.15	0.01	0.00	19.71	2.00	0.00	0.15	0.01	0.00
19.72	2.00	0.00	0.14	0.01	0.00	19.73	2.00	0.00	0.14	0.01	0.00
19.74	2.00	0.00	0.13	0.01	0.00	19.75	2.00	0.00	0.13	0.01	0.00
19.76	2.00	0.00	0.12	0.01	0.00	19.77	2.00	0.00	0.12	0.01	0.00
19.78	2.00	0.00	0.11	0.01	0.00	19.79	2.00	0.00	0.11	0.01	0.00
19.80	2.00	0.00	0.10	0.01	0.00	19.81	2.00	0.00	0.10	0.01	0.00
19.82	2.00	0.00	0.09	0.01	0.00	19.83	2.00	0.00	0.09	0.01	0.00
19.84	2.00	0.00	0.08	0.01	0.00	19.85	2.00	0.00	0.07	0.01	0.00
19.86	2.00	0.00	0.07	0.01	0.00	19.87	2.00	0.00	0.06	0.01	0.00
19.88	2.00	0.00	0.06	0.01	0.00	19.89	2.00	0.00	0.05	0.01	0.00
19.90	2.00	0.00	0.05	0.01	0.00	19.91	2.00	0.00	0.04	0.01	0.00
19.92	2.00	0.00	0.04	0.01	0.00	19.93	2.00	0.00	0.04	0.01	0.00
19.94	2.00	0.00	0.03	0.01	0.00	19.95	2.00	0.00	0.03	0.01	0.00
19.96	2.00	0.00	0.02	0.01	0.00	19.97	2.00	0.00	0.02	0.01	0.00
19.98	2.00	0.00	0.01	0.01	0.00	19.99	2.00	0.00	0.01	0.01	0.00
20.00	2.00	0.00	0.00	0.01	0.00						

**Overall liquefaction potential: 3.29**

LPI = 0.00 - Liquefaction risk very low  
LPI between 0.00 and 5.00 - Liquefaction risk low  
LPI between 5.00 and 15.00 - Liquefaction risk high  
LPI > 15.00 - Liquefaction risk very high

**Abbreviations**

FS: Calculated factor of safety for test point  
F<sub>L</sub>: 1 - FS  
w<sub>z</sub>: Function value of the extend of soil liquefaction according to depth  
d<sub>z</sub>: Layer thickness (m)  
LPI: Liquefaction potential index value for test point

**LIQUEFACTION ANALYSIS REPORT**

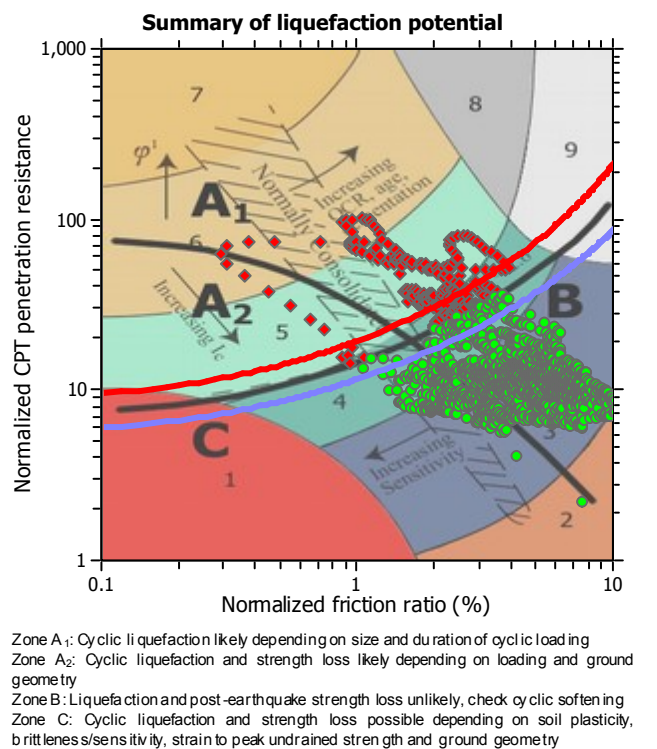
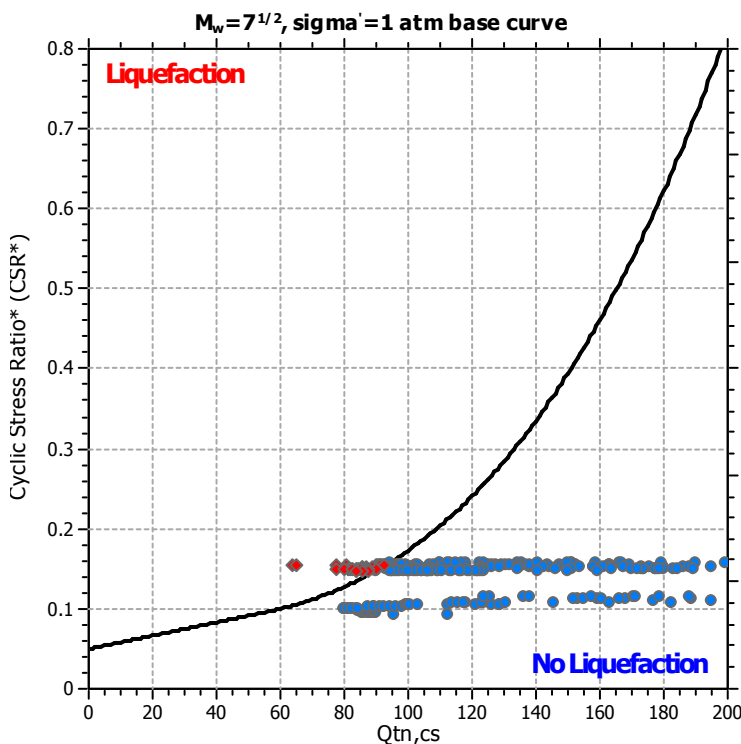
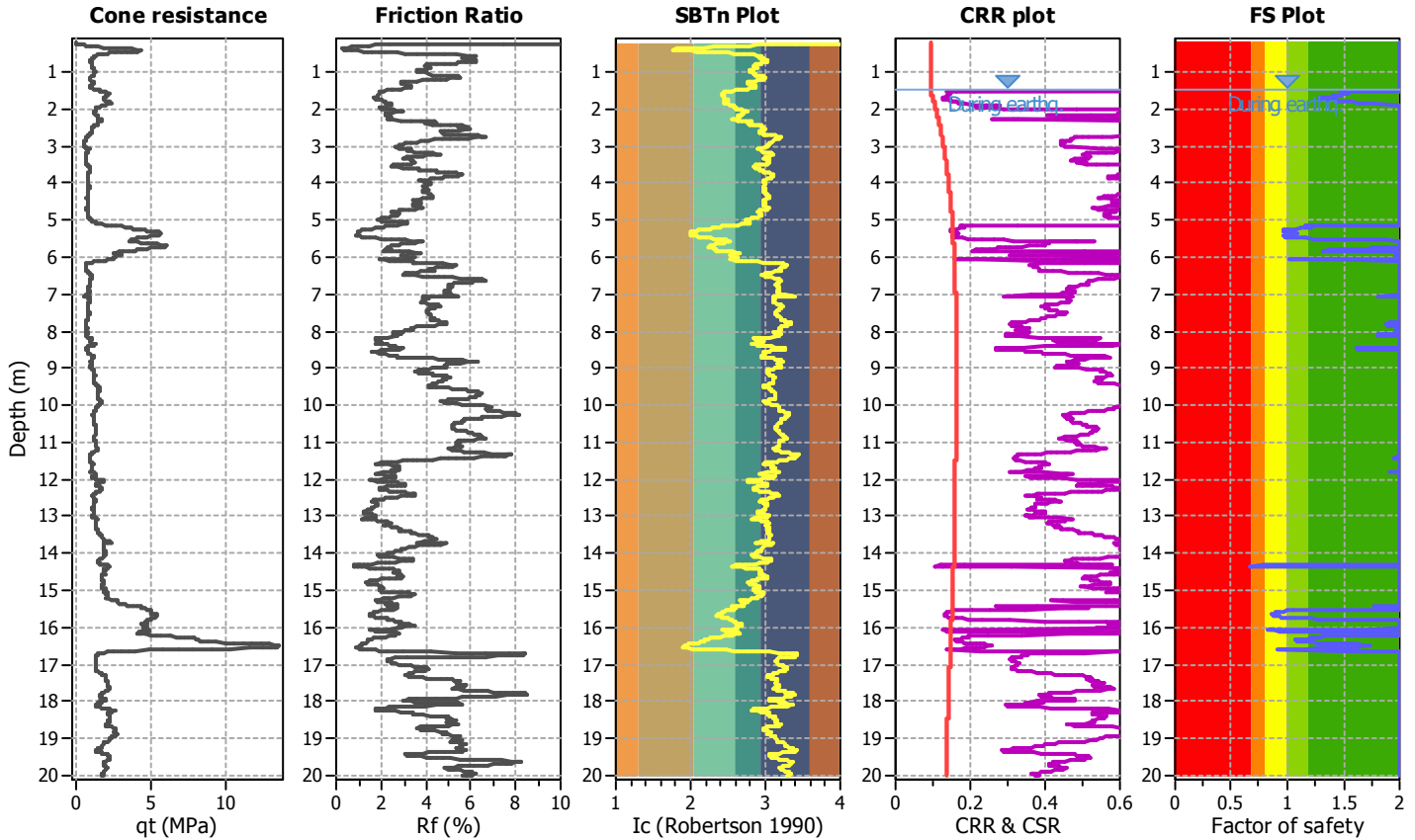
**Project title : Dr. Sergio Lasagna**

**Location : P.U.A. Via Romana - Medolla**

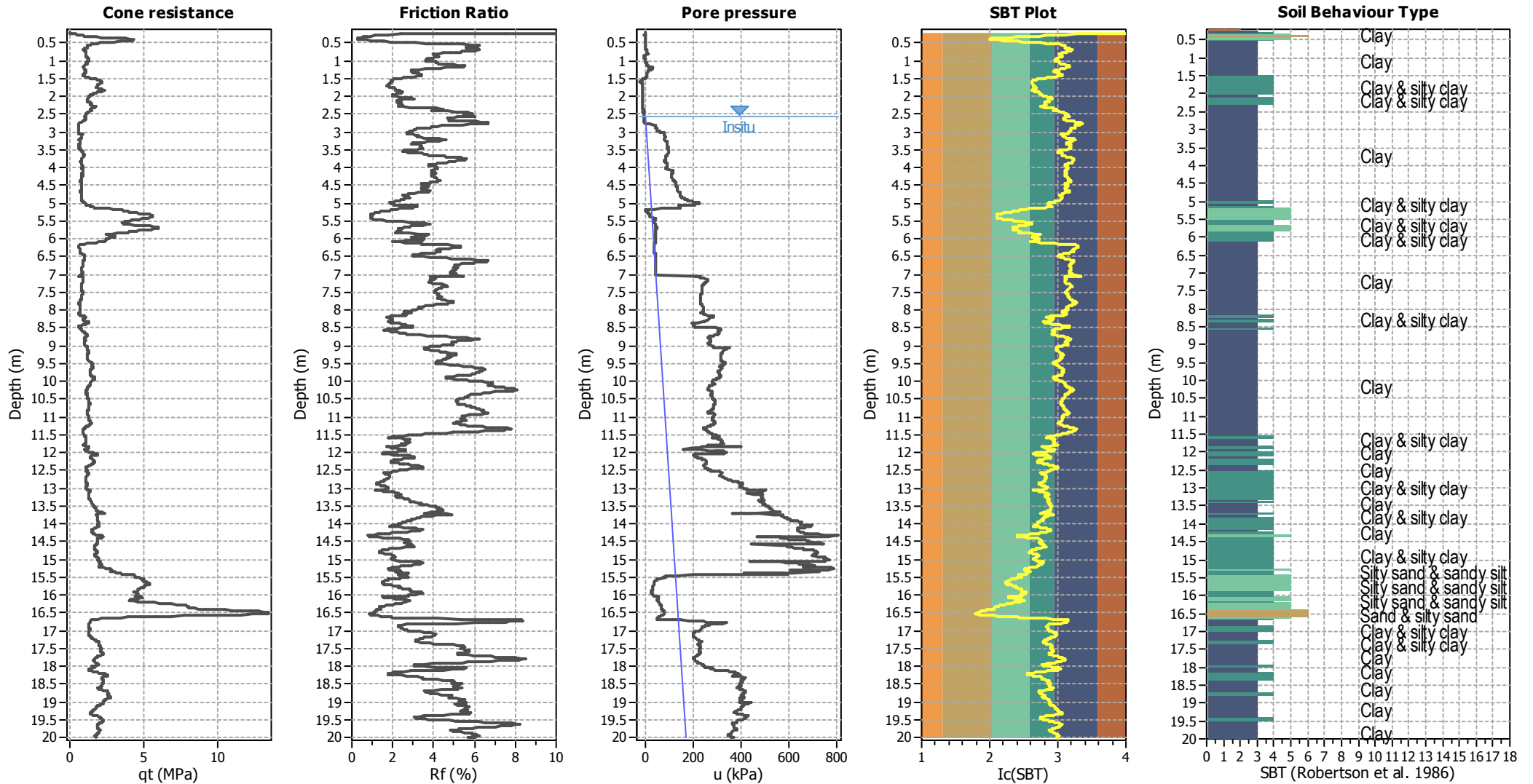
**CPT file : CPTU 1**

**Input parameters and analysis data**

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	2.55 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude $M_w$ :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes		



### CPT basic interpretation plots



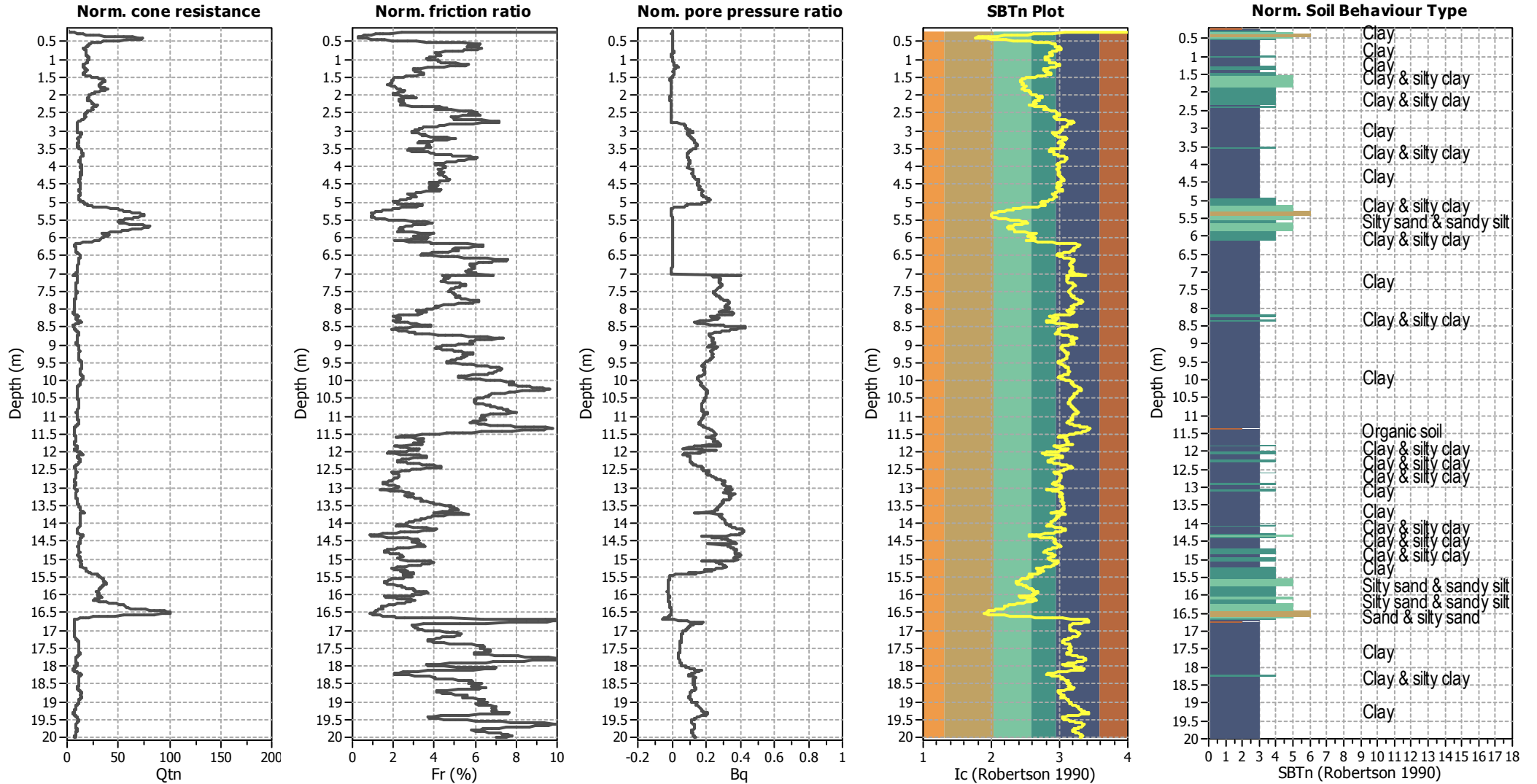
#### Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>0</sub> applied:	Yes
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

#### SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

### CPT basic interpretation plots (normalized)



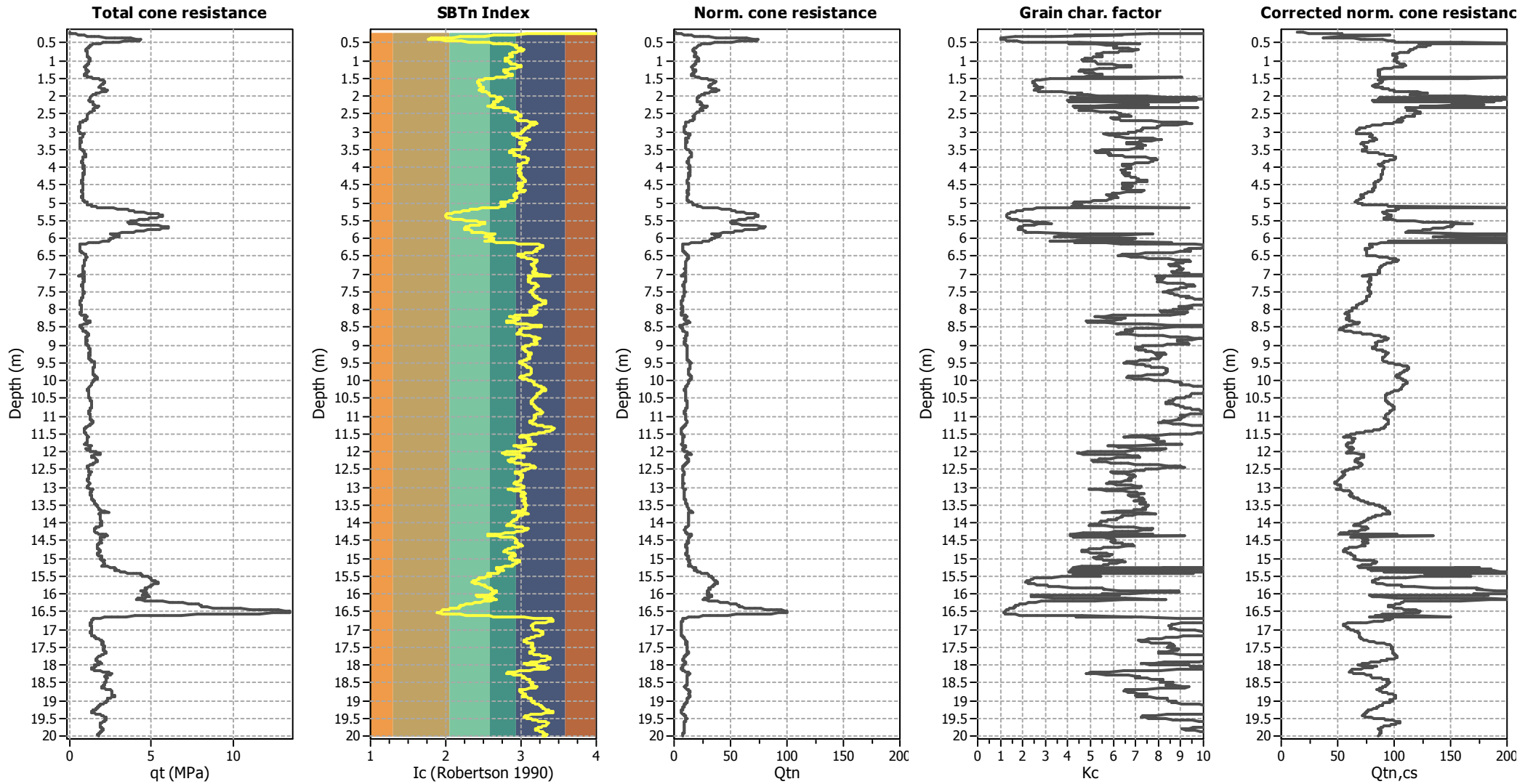
#### Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>s</sub> applied:	Yes
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

#### SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

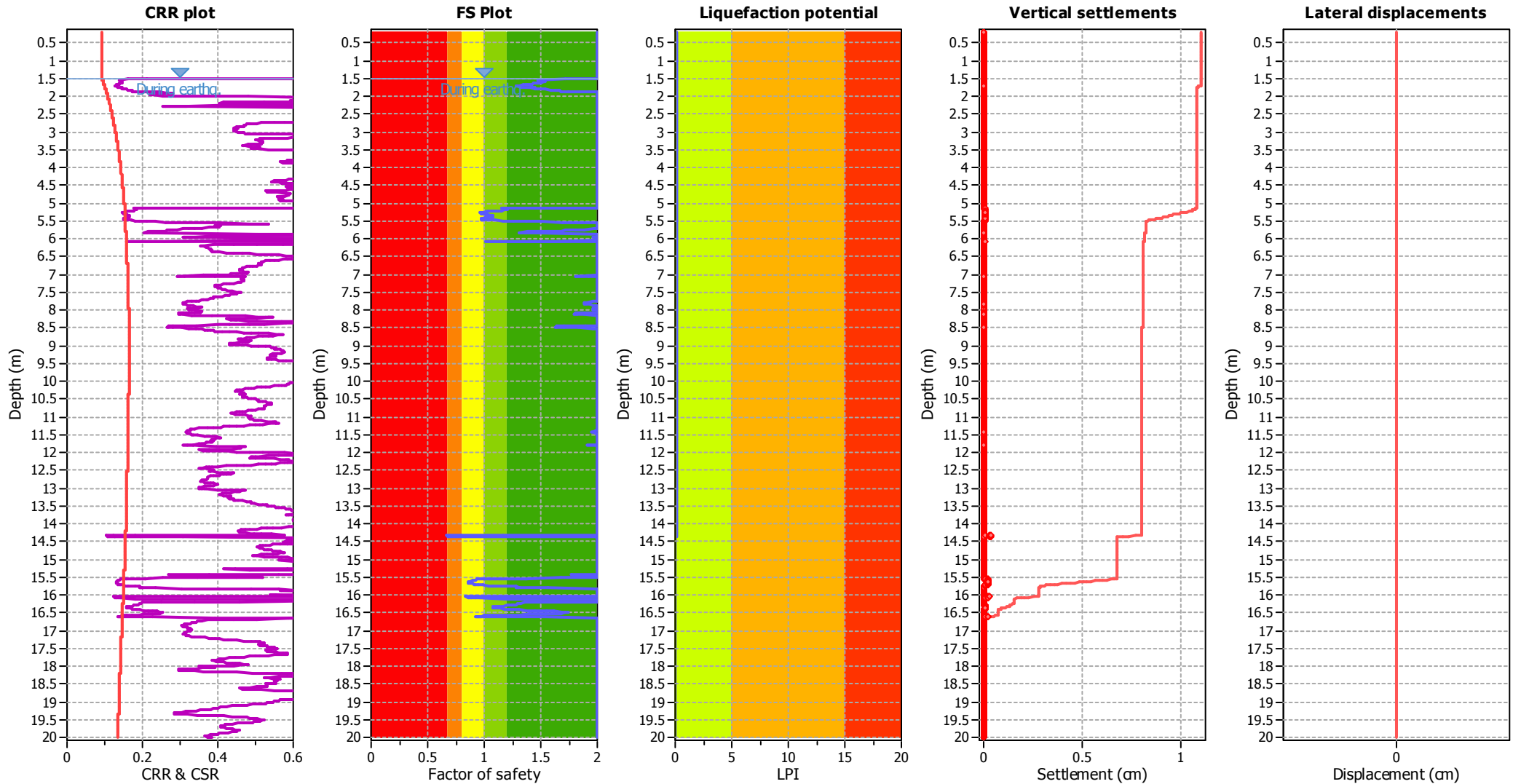
### Liquefaction analysis overall plots (intermediate results)



#### Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>v</sub> applied:	Yes
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

### Liquefaction analysis overall plots



**Input parameters and analysis data**

Analysis method:	Robertson (2009)	Depth to water table (earthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	$K_v$ applied:	Yes
Earthquake magnitude $M_w$ :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

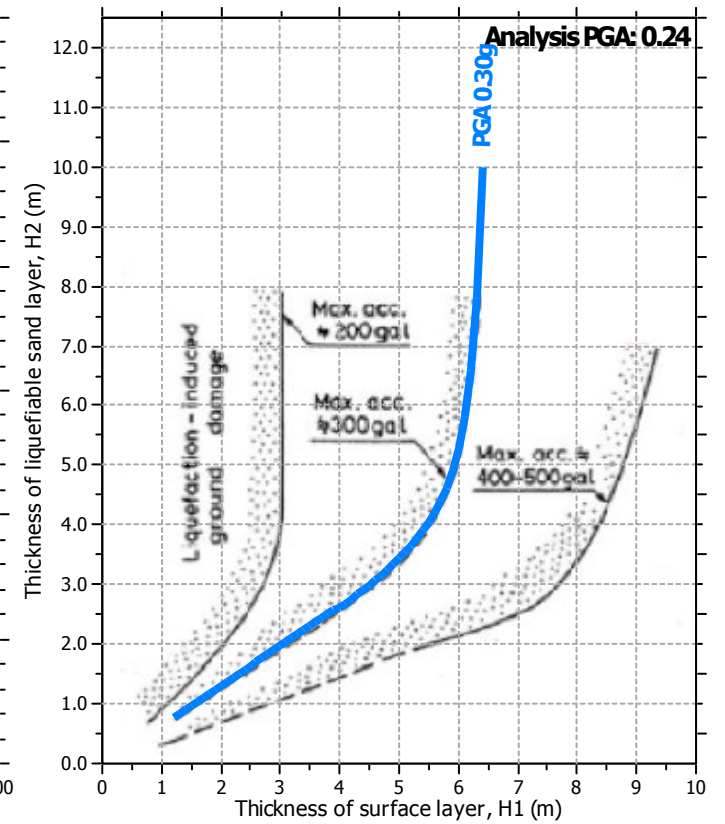
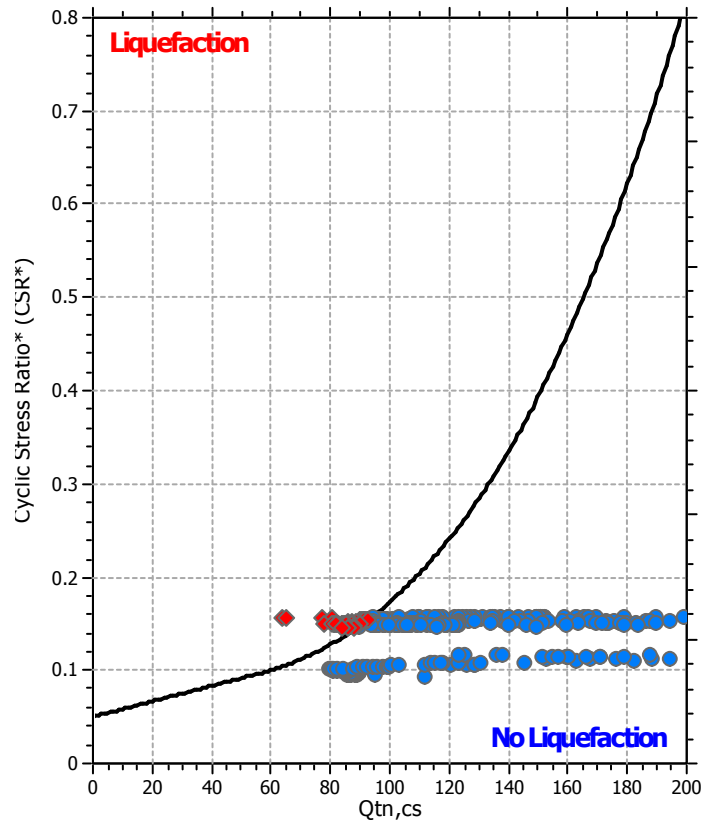
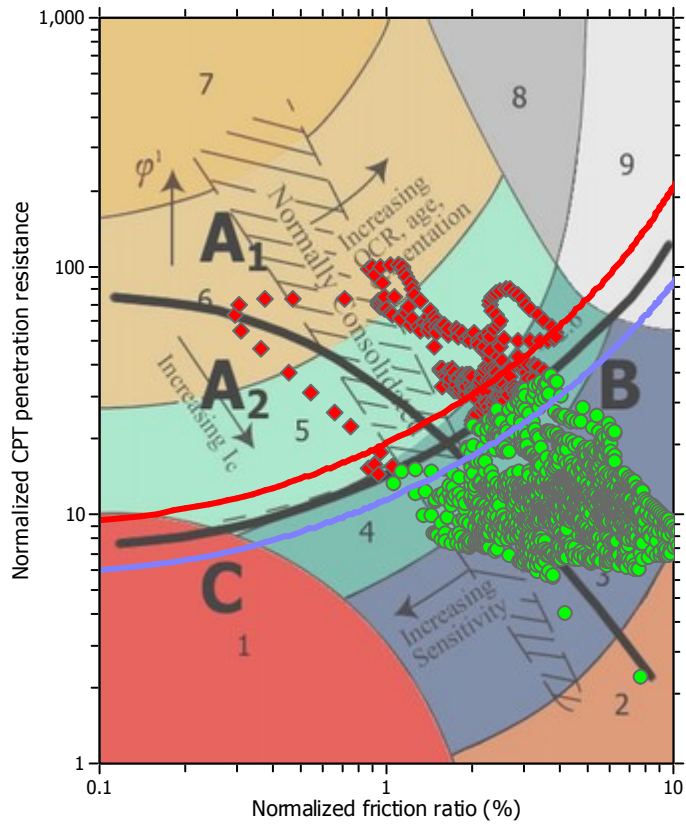
**F.S. color scheme**

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

**LPI color scheme**

- Very high risk
- High risk
- Low risk

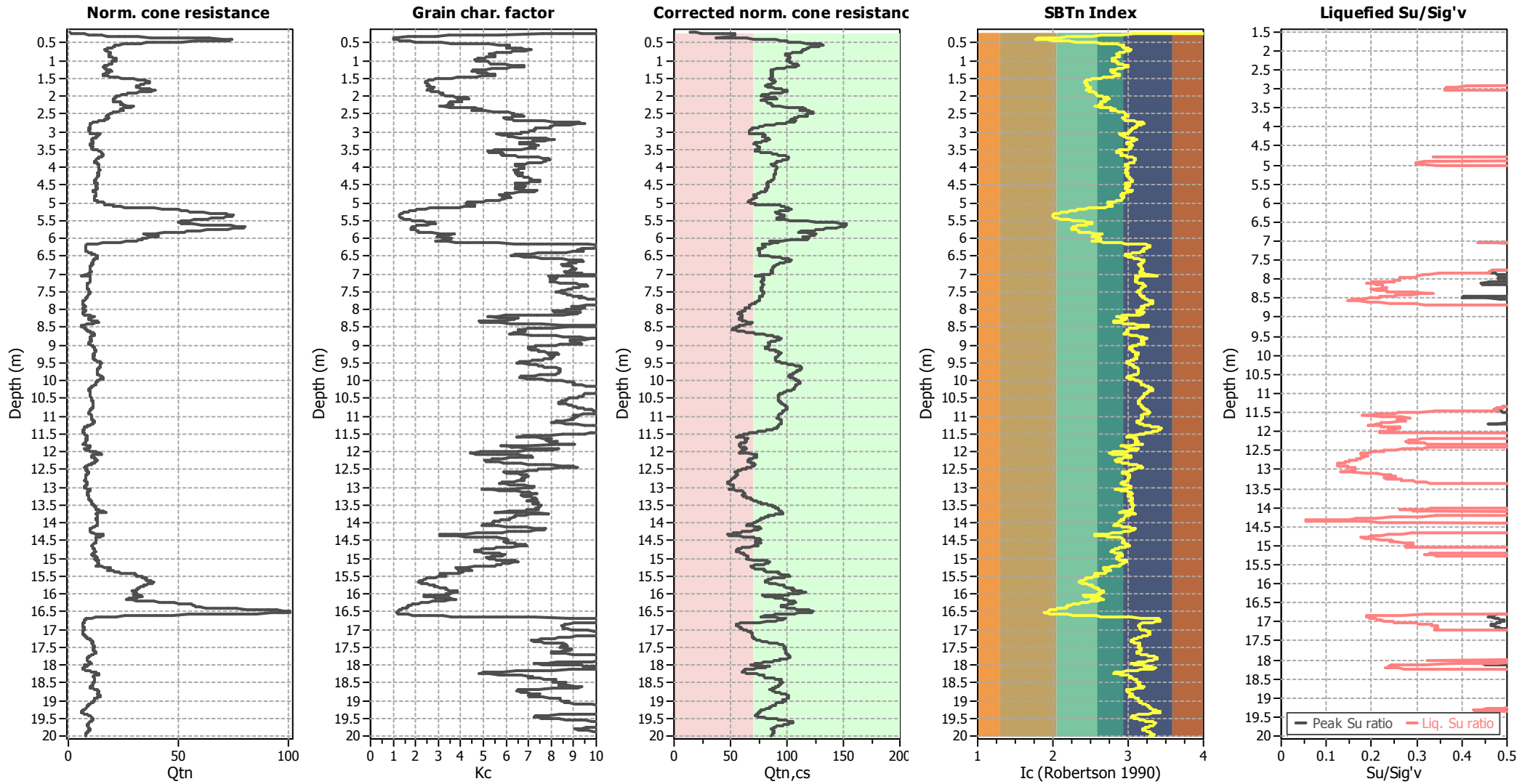
### Liquefaction analysis summary plots



#### Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (earthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on $I_c$ value	$I_c$ cut-off value:	2.60	$K_v$ applied:	Yes
Earthquake magnitude $M_w$ :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

### Check for strength loss plots (Robertson (2010))



#### Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K <sub>v</sub> applied:	Yes
Earthquake magnitude M <sub>w</sub> :	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.55 m	Fill height:	N/A	Limit depth:	N/A

:: Liquefaction Potential Index calculation data ::											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
0.20	2.00	0.00	9.90	0.01	0.00	0.21	2.00	0.00	9.90	0.01	0.00
0.22	2.00	0.00	9.89	0.01	0.00	0.23	2.00	0.00	9.89	0.01	0.00
0.24	2.00	0.00	9.88	0.01	0.00	0.25	2.00	0.00	9.88	0.01	0.00
0.26	2.00	0.00	9.87	0.01	0.00	0.27	2.00	0.00	9.87	0.01	0.00
0.28	2.00	0.00	9.86	0.01	0.00	0.29	2.00	0.00	9.86	0.01	0.00
0.30	2.00	0.00	9.85	0.01	0.00	0.31	2.00	0.00	9.85	0.01	0.00
0.32	2.00	0.00	9.84	0.01	0.00	0.33	2.00	0.00	9.84	0.01	0.00
0.34	2.00	0.00	9.83	0.01	0.00	0.35	2.00	0.00	9.82	0.01	0.00
0.36	2.00	0.00	9.82	0.01	0.00	0.37	2.00	0.00	9.82	0.01	0.00
0.38	2.00	0.00	9.81	0.01	0.00	0.39	2.00	0.00	9.81	0.01	0.00
0.40	2.00	0.00	9.80	0.01	0.00	0.41	2.00	0.00	9.80	0.01	0.00
0.42	2.00	0.00	9.79	0.01	0.00	0.43	2.00	0.00	9.79	0.01	0.00
0.44	2.00	0.00	9.78	0.01	0.00	0.45	2.00	0.00	9.78	0.01	0.00
0.46	2.00	0.00	9.77	0.01	0.00	0.47	2.00	0.00	9.77	0.01	0.00
0.48	2.00	0.00	9.76	0.01	0.00	0.49	2.00	0.00	9.76	0.01	0.00
0.50	2.00	0.00	9.75	0.01	0.00	0.51	2.00	0.00	9.74	0.01	0.00
0.52	2.00	0.00	9.74	0.01	0.00	0.53	2.00	0.00	9.74	0.01	0.00
0.54	2.00	0.00	9.73	0.01	0.00	0.55	2.00	0.00	9.73	0.01	0.00
0.56	2.00	0.00	9.72	0.01	0.00	0.57	2.00	0.00	9.72	0.01	0.00
0.58	2.00	0.00	9.71	0.01	0.00	0.59	2.00	0.00	9.71	0.01	0.00
0.60	2.00	0.00	9.70	0.01	0.00	0.61	2.00	0.00	9.70	0.01	0.00
0.62	2.00	0.00	9.69	0.01	0.00	0.63	2.00	0.00	9.69	0.01	0.00
0.64	2.00	0.00	9.68	0.01	0.00	0.65	2.00	0.00	9.68	0.01	0.00
0.66	2.00	0.00	9.67	0.01	0.00	0.67	2.00	0.00	9.66	0.01	0.00
0.68	2.00	0.00	9.66	0.01	0.00	0.69	2.00	0.00	9.66	0.01	0.00
0.70	2.00	0.00	9.65	0.01	0.00	0.71	2.00	0.00	9.65	0.01	0.00
0.72	2.00	0.00	9.64	0.01	0.00	0.73	2.00	0.00	9.64	0.01	0.00
0.74	2.00	0.00	9.63	0.01	0.00	0.75	2.00	0.00	9.63	0.01	0.00
0.76	2.00	0.00	9.62	0.01	0.00	0.77	2.00	0.00	9.62	0.01	0.00
0.78	2.00	0.00	9.61	0.01	0.00	0.79	2.00	0.00	9.61	0.01	0.00
0.80	2.00	0.00	9.60	0.01	0.00	0.81	2.00	0.00	9.60	0.01	0.00
0.82	2.00	0.00	9.59	0.01	0.00	0.83	2.00	0.00	9.59	0.01	0.00
0.84	2.00	0.00	9.58	0.01	0.00	0.85	2.00	0.00	9.57	0.01	0.00
0.86	2.00	0.00	9.57	0.01	0.00	0.87	2.00	0.00	9.57	0.01	0.00
0.88	2.00	0.00	9.56	0.01	0.00	0.89	2.00	0.00	9.56	0.01	0.00
0.90	2.00	0.00	9.55	0.01	0.00	0.91	2.00	0.00	9.55	0.01	0.00
0.92	2.00	0.00	9.54	0.01	0.00	0.93	2.00	0.00	9.54	0.01	0.00
0.94	2.00	0.00	9.53	0.01	0.00	0.95	2.00	0.00	9.53	0.01	0.00
0.96	2.00	0.00	9.52	0.01	0.00	0.97	2.00	0.00	9.52	0.01	0.00
0.98	2.00	0.00	9.51	0.01	0.00	0.99	2.00	0.00	9.51	0.01	0.00
1.00	2.00	0.00	9.50	0.01	0.00	1.01	2.00	0.00	9.49	0.01	0.00
1.02	2.00	0.00	9.49	0.01	0.00	1.03	2.00	0.00	9.49	0.01	0.00
1.04	2.00	0.00	9.48	0.01	0.00	1.05	2.00	0.00	9.48	0.01	0.00
1.06	2.00	0.00	9.47	0.01	0.00	1.07	2.00	0.00	9.47	0.01	0.00
1.08	2.00	0.00	9.46	0.01	0.00	1.09	2.00	0.00	9.46	0.01	0.00
1.10	2.00	0.00	9.45	0.01	0.00	1.11	2.00	0.00	9.45	0.01	0.00
1.12	2.00	0.00	9.44	0.01	0.00	1.13	2.00	0.00	9.44	0.01	0.00
1.14	2.00	0.00	9.43	0.01	0.00	1.15	2.00	0.00	9.43	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
1.16	2.00	0.00	9.42	0.01	0.00	1.17	2.00	0.00	9.41	0.01	0.00
1.18	2.00	0.00	9.41	0.01	0.00	1.19	2.00	0.00	9.41	0.01	0.00
1.20	2.00	0.00	9.40	0.01	0.00	1.21	2.00	0.00	9.40	0.01	0.00
1.22	2.00	0.00	9.39	0.01	0.00	1.23	2.00	0.00	9.39	0.01	0.00
1.24	2.00	0.00	9.38	0.01	0.00	1.25	2.00	0.00	9.38	0.01	0.00
1.26	2.00	0.00	9.37	0.01	0.00	1.27	2.00	0.00	9.37	0.01	0.00
1.28	2.00	0.00	9.36	0.01	0.00	1.29	2.00	0.00	9.36	0.01	0.00
1.30	2.00	0.00	9.35	0.01	0.00	1.31	2.00	0.00	9.35	0.01	0.00
1.32	2.00	0.00	9.34	0.01	0.00	1.33	2.00	0.00	9.34	0.01	0.00
1.34	2.00	0.00	9.33	0.01	0.00	1.35	2.00	0.00	9.32	0.01	0.00
1.36	2.00	0.00	9.32	0.01	0.00	1.37	2.00	0.00	9.32	0.01	0.00
1.38	2.00	0.00	9.31	0.01	0.00	1.39	2.00	0.00	9.31	0.01	0.00
1.40	2.00	0.00	9.30	0.01	0.00	1.41	2.00	0.00	9.30	0.01	0.00
1.42	2.00	0.00	9.29	0.01	0.00	1.43	2.00	0.00	9.29	0.01	0.00
1.44	2.00	0.00	9.28	0.01	0.00	1.45	2.00	0.00	9.28	0.01	0.00
1.46	2.00	0.00	9.27	0.01	0.00	1.47	2.00	0.00	9.27	0.01	0.00
1.48	2.00	0.00	9.26	0.01	0.00	1.49	2.00	0.00	9.26	0.01	0.00
1.50	2.00	0.00	9.25	0.01	0.00	1.51	2.00	0.00	9.24	0.01	0.00
1.52	1.72	0.00	9.24	0.01	0.00	1.53	1.48	0.00	9.24	0.01	0.00
1.54	1.49	0.00	9.23	0.01	0.00	1.55	1.51	0.00	9.23	0.01	0.00
1.56	1.52	0.00	9.22	0.01	0.00	1.57	1.54	0.00	9.22	0.01	0.00
1.58	1.54	0.00	9.21	0.01	0.00	1.59	1.54	0.00	9.21	0.01	0.00
1.60	1.52	0.00	9.20	0.01	0.00	1.61	1.50	0.00	9.20	0.01	0.00
1.62	1.48	0.00	9.19	0.01	0.00	1.63	1.46	0.00	9.19	0.01	0.00
1.64	1.44	0.00	9.18	0.01	0.00	1.65	1.43	0.00	9.18	0.01	0.00
1.66	1.40	0.00	9.17	0.01	0.00	1.67	1.38	0.00	9.16	0.01	0.00
1.68	1.37	0.00	9.16	0.01	0.00	1.69	1.34	0.00	9.16	0.01	0.00
1.70	1.31	0.00	9.15	0.01	0.00	1.71	1.29	0.00	9.15	0.01	0.00
1.72	1.28	0.00	9.14	0.01	0.00	1.73	1.30	0.00	9.14	0.01	0.00
1.74	1.32	0.00	9.13	0.01	0.00	1.75	1.35	0.00	9.13	0.01	0.00
1.76	1.45	0.00	9.12	0.01	0.00	1.77	1.41	0.00	9.12	0.01	0.00
1.78	1.44	0.00	9.11	0.01	0.00	1.79	1.47	0.00	9.11	0.01	0.00
1.80	1.50	0.00	9.10	0.01	0.00	1.81	1.54	0.00	9.10	0.01	0.00
1.82	1.58	0.00	9.09	0.01	0.00	1.83	1.63	0.00	9.09	0.01	0.00
1.84	1.65	0.00	9.08	0.01	0.00	1.85	1.67	0.00	9.07	0.01	0.00
1.86	1.67	0.00	9.07	0.01	0.00	1.87	1.75	0.00	9.07	0.01	0.00
1.88	2.00	0.00	9.06	0.01	0.00	1.89	2.00	0.00	9.06	0.01	0.00
1.90	2.00	0.00	9.05	0.01	0.00	1.91	2.00	0.00	9.05	0.01	0.00
1.92	2.00	0.00	9.04	0.01	0.00	1.93	2.00	0.00	9.04	0.01	0.00
1.94	2.00	0.00	9.03	0.01	0.00	1.95	2.00	0.00	9.03	0.01	0.00
1.96	2.00	0.00	9.02	0.01	0.00	1.97	2.00	0.00	9.02	0.01	0.00
1.98	2.00	0.00	9.01	0.01	0.00	1.99	2.00	0.00	9.01	0.01	0.00
2.00	2.00	0.00	9.00	0.01	0.00	2.01	2.00	0.00	8.99	0.01	0.00
2.02	2.00	0.00	8.99	0.01	0.00	2.03	2.00	0.00	8.99	0.01	0.00
2.04	2.00	0.00	8.98	0.01	0.00	2.05	2.00	0.00	8.98	0.01	0.00
2.06	2.00	0.00	8.97	0.01	0.00	2.07	2.00	0.00	8.97	0.01	0.00
2.08	2.00	0.00	8.96	0.01	0.00	2.09	2.00	0.00	8.96	0.01	0.00
2.10	2.00	0.00	8.95	0.01	0.00	2.11	2.00	0.00	8.95	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
2.12	2.00	0.00	8.94	0.01	0.00	2.13	2.00	0.00	8.94	0.01	0.00
2.14	2.00	0.00	8.93	0.01	0.00	2.15	2.00	0.00	8.93	0.01	0.00
2.16	2.00	0.00	8.92	0.01	0.00	2.17	2.00	0.00	8.91	0.01	0.00
2.18	2.00	0.00	8.91	0.01	0.00	2.19	2.00	0.00	8.91	0.01	0.00
2.20	2.00	0.00	8.90	0.01	0.00	2.21	2.00	0.00	8.90	0.01	0.00
2.22	2.00	0.00	8.89	0.01	0.00	2.23	2.00	0.00	8.89	0.01	0.00
2.24	2.00	0.00	8.88	0.01	0.00	2.25	2.00	0.00	8.88	0.01	0.00
2.26	2.00	0.00	8.87	0.01	0.00	2.27	2.00	0.00	8.87	0.01	0.00
2.28	2.00	0.00	8.86	0.01	0.00	2.29	2.00	0.00	8.86	0.01	0.00
2.30	2.00	0.00	8.85	0.01	0.00	2.31	2.00	0.00	8.85	0.01	0.00
2.32	2.00	0.00	8.84	0.01	0.00	2.33	2.00	0.00	8.84	0.01	0.00
2.34	2.00	0.00	8.83	0.01	0.00	2.35	2.00	0.00	8.82	0.01	0.00
2.36	2.00	0.00	8.82	0.01	0.00	2.37	2.00	0.00	8.82	0.01	0.00
2.38	2.00	0.00	8.81	0.01	0.00	2.39	2.00	0.00	8.81	0.01	0.00
2.40	2.00	0.00	8.80	0.01	0.00	2.41	2.00	0.00	8.80	0.01	0.00
2.42	2.00	0.00	8.79	0.01	0.00	2.43	2.00	0.00	8.79	0.01	0.00
2.44	2.00	0.00	8.78	0.01	0.00	2.45	2.00	0.00	8.78	0.01	0.00
2.46	2.00	0.00	8.77	0.01	0.00	2.47	2.00	0.00	8.77	0.01	0.00
2.48	2.00	0.00	8.76	0.01	0.00	2.49	2.00	0.00	8.76	0.01	0.00
2.50	2.00	0.00	8.75	0.01	0.00	2.51	2.00	0.00	8.74	0.01	0.00
2.52	2.00	0.00	8.74	0.01	0.00	2.53	2.00	0.00	8.74	0.01	0.00
2.54	2.00	0.00	8.73	0.01	0.00	2.55	2.00	0.00	8.73	0.01	0.00
2.56	2.00	0.00	8.72	0.01	0.00	2.57	2.00	0.00	8.72	0.01	0.00
2.58	2.00	0.00	8.71	0.01	0.00	2.59	2.00	0.00	8.71	0.01	0.00
2.60	2.00	0.00	8.70	0.01	0.00	2.61	2.00	0.00	8.70	0.01	0.00
2.62	2.00	0.00	8.69	0.01	0.00	2.63	2.00	0.00	8.69	0.01	0.00
2.64	2.00	0.00	8.68	0.01	0.00	2.65	2.00	0.00	8.68	0.01	0.00
2.66	2.00	0.00	8.67	0.01	0.00	2.67	2.00	0.00	8.66	0.01	0.00
2.68	2.00	0.00	8.66	0.01	0.00	2.69	2.00	0.00	8.66	0.01	0.00
2.70	2.00	0.00	8.65	0.01	0.00	2.71	2.00	0.00	8.65	0.01	0.00
2.72	2.00	0.00	8.64	0.01	0.00	2.73	2.00	0.00	8.64	0.01	0.00
2.74	2.00	0.00	8.63	0.01	0.00	2.75	2.00	0.00	8.63	0.01	0.00
2.76	2.00	0.00	8.62	0.01	0.00	2.77	2.00	0.00	8.62	0.01	0.00
2.78	2.00	0.00	8.61	0.01	0.00	2.79	2.00	0.00	8.61	0.01	0.00
2.80	2.00	0.00	8.60	0.01	0.00	2.81	2.00	0.00	8.60	0.01	0.00
2.82	2.00	0.00	8.59	0.01	0.00	2.83	2.00	0.00	8.59	0.01	0.00
2.84	2.00	0.00	8.58	0.01	0.00	2.85	2.00	0.00	8.57	0.01	0.00
2.86	2.00	0.00	8.57	0.01	0.00	2.87	2.00	0.00	8.57	0.01	0.00
2.88	2.00	0.00	8.56	0.01	0.00	2.89	2.00	0.00	8.56	0.01	0.00
2.90	2.00	0.00	8.55	0.01	0.00	2.91	2.00	0.00	8.55	0.01	0.00
2.92	2.00	0.00	8.54	0.01	0.00	2.93	2.00	0.00	8.54	0.01	0.00
2.94	2.00	0.00	8.53	0.01	0.00	2.95	2.00	0.00	8.53	0.01	0.00
2.96	2.00	0.00	8.52	0.01	0.00	2.97	2.00	0.00	8.52	0.01	0.00
2.98	2.00	0.00	8.51	0.01	0.00	2.99	2.00	0.00	8.51	0.01	0.00
3.00	2.00	0.00	8.50	0.01	0.00	3.01	2.00	0.00	8.49	0.01	0.00
3.02	2.00	0.00	8.49	0.01	0.00	3.03	2.00	0.00	8.49	0.01	0.00
3.04	2.00	0.00	8.48	0.01	0.00	3.05	2.00	0.00	8.48	0.01	0.00
3.06	2.00	0.00	8.47	0.01	0.00	3.07	2.00	0.00	8.47	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
3.08	2.00	0.00	8.46	0.01	0.00	3.09	2.00	0.00	8.46	0.01	0.00
3.10	2.00	0.00	8.45	0.01	0.00	3.11	2.00	0.00	8.45	0.01	0.00
3.12	2.00	0.00	8.44	0.01	0.00	3.13	2.00	0.00	8.44	0.01	0.00
3.14	2.00	0.00	8.43	0.01	0.00	3.15	2.00	0.00	8.43	0.01	0.00
3.16	2.00	0.00	8.42	0.01	0.00	3.17	2.00	0.00	8.41	0.01	0.00
3.18	2.00	0.00	8.41	0.01	0.00	3.19	2.00	0.00	8.41	0.01	0.00
3.20	2.00	0.00	8.40	0.01	0.00	3.21	2.00	0.00	8.40	0.01	0.00
3.22	2.00	0.00	8.39	0.01	0.00	3.23	2.00	0.00	8.39	0.01	0.00
3.24	2.00	0.00	8.38	0.01	0.00	3.25	2.00	0.00	8.38	0.01	0.00
3.26	2.00	0.00	8.37	0.01	0.00	3.27	2.00	0.00	8.37	0.01	0.00
3.28	2.00	0.00	8.36	0.01	0.00	3.29	2.00	0.00	8.36	0.01	0.00
3.30	2.00	0.00	8.35	0.01	0.00	3.31	2.00	0.00	8.35	0.01	0.00
3.32	2.00	0.00	8.34	0.01	0.00	3.33	2.00	0.00	8.34	0.01	0.00
3.34	2.00	0.00	8.33	0.01	0.00	3.35	2.00	0.00	8.32	0.01	0.00
3.36	2.00	0.00	8.32	0.01	0.00	3.37	2.00	0.00	8.32	0.01	0.00
3.38	2.00	0.00	8.31	0.01	0.00	3.39	2.00	0.00	8.31	0.01	0.00
3.40	2.00	0.00	8.30	0.01	0.00	3.41	2.00	0.00	8.30	0.01	0.00
3.42	2.00	0.00	8.29	0.01	0.00	3.43	2.00	0.00	8.29	0.01	0.00
3.44	2.00	0.00	8.28	0.01	0.00	3.45	2.00	0.00	8.28	0.01	0.00
3.46	2.00	0.00	8.27	0.01	0.00	3.47	2.00	0.00	8.27	0.01	0.00
3.48	2.00	0.00	8.26	0.01	0.00	3.49	2.00	0.00	8.26	0.01	0.00
3.50	2.00	0.00	8.25	0.01	0.00	3.51	2.00	0.00	8.24	0.01	0.00
3.52	2.00	0.00	8.24	0.01	0.00	3.53	2.00	0.00	8.24	0.01	0.00
3.54	2.00	0.00	8.23	0.01	0.00	3.55	2.00	0.00	8.23	0.01	0.00
3.56	2.00	0.00	8.22	0.01	0.00	3.57	2.00	0.00	8.22	0.01	0.00
3.58	2.00	0.00	8.21	0.01	0.00	3.59	2.00	0.00	8.21	0.01	0.00
3.60	2.00	0.00	8.20	0.01	0.00	3.61	2.00	0.00	8.20	0.01	0.00
3.62	2.00	0.00	8.19	0.01	0.00	3.63	2.00	0.00	8.19	0.01	0.00
3.64	2.00	0.00	8.18	0.01	0.00	3.65	2.00	0.00	8.18	0.01	0.00
3.66	2.00	0.00	8.17	0.01	0.00	3.67	2.00	0.00	8.16	0.01	0.00
3.68	2.00	0.00	8.16	0.01	0.00	3.69	2.00	0.00	8.16	0.01	0.00
3.70	2.00	0.00	8.15	0.01	0.00	3.71	2.00	0.00	8.15	0.01	0.00
3.72	2.00	0.00	8.14	0.01	0.00	3.73	2.00	0.00	8.14	0.01	0.00
3.74	2.00	0.00	8.13	0.01	0.00	3.75	2.00	0.00	8.13	0.01	0.00
3.76	2.00	0.00	8.12	0.01	0.00	3.77	2.00	0.00	8.12	0.01	0.00
3.78	2.00	0.00	8.11	0.01	0.00	3.79	2.00	0.00	8.11	0.01	0.00
3.80	2.00	0.00	8.10	0.01	0.00	3.81	2.00	0.00	8.10	0.01	0.00
3.82	2.00	0.00	8.09	0.01	0.00	3.83	2.00	0.00	8.09	0.01	0.00
3.84	2.00	0.00	8.08	0.01	0.00	3.85	2.00	0.00	8.07	0.01	0.00
3.86	2.00	0.00	8.07	0.01	0.00	3.87	2.00	0.00	8.07	0.01	0.00
3.88	2.00	0.00	8.06	0.01	0.00	3.89	2.00	0.00	8.06	0.01	0.00
3.90	2.00	0.00	8.05	0.01	0.00	3.91	2.00	0.00	8.05	0.01	0.00
3.92	2.00	0.00	8.04	0.01	0.00	3.93	2.00	0.00	8.04	0.01	0.00
3.94	2.00	0.00	8.03	0.01	0.00	3.95	2.00	0.00	8.03	0.01	0.00
3.96	2.00	0.00	8.02	0.01	0.00	3.97	2.00	0.00	8.02	0.01	0.00
3.98	2.00	0.00	8.01	0.01	0.00	3.99	2.00	0.00	8.01	0.01	0.00
4.00	2.00	0.00	8.00	0.01	0.00	4.01	2.00	0.00	8.00	0.01	0.00
4.02	2.00	0.00	7.99	0.01	0.00	4.03	2.00	0.00	7.99	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
4.04	2.00	0.00	7.98	0.01	0.00	4.05	2.00	0.00	7.98	0.01	0.00
4.06	2.00	0.00	7.97	0.01	0.00	4.07	2.00	0.00	7.97	0.01	0.00
4.08	2.00	0.00	7.96	0.01	0.00	4.09	2.00	0.00	7.96	0.01	0.00
4.10	2.00	0.00	7.95	0.01	0.00	4.11	2.00	0.00	7.95	0.01	0.00
4.12	2.00	0.00	7.94	0.01	0.00	4.13	2.00	0.00	7.94	0.01	0.00
4.14	2.00	0.00	7.93	0.01	0.00	4.15	2.00	0.00	7.93	0.01	0.00
4.16	2.00	0.00	7.92	0.01	0.00	4.17	2.00	0.00	7.92	0.01	0.00
4.18	2.00	0.00	7.91	0.01	0.00	4.19	2.00	0.00	7.91	0.01	0.00
4.20	2.00	0.00	7.90	0.01	0.00	4.21	2.00	0.00	7.90	0.01	0.00
4.22	2.00	0.00	7.89	0.01	0.00	4.23	2.00	0.00	7.89	0.01	0.00
4.24	2.00	0.00	7.88	0.01	0.00	4.25	2.00	0.00	7.88	0.01	0.00
4.26	2.00	0.00	7.87	0.01	0.00	4.27	2.00	0.00	7.87	0.01	0.00
4.28	2.00	0.00	7.86	0.01	0.00	4.29	2.00	0.00	7.86	0.01	0.00
4.30	2.00	0.00	7.85	0.01	0.00	4.31	2.00	0.00	7.85	0.01	0.00
4.32	2.00	0.00	7.84	0.01	0.00	4.33	2.00	0.00	7.84	0.01	0.00
4.34	2.00	0.00	7.83	0.01	0.00	4.35	2.00	0.00	7.83	0.01	0.00
4.36	2.00	0.00	7.82	0.01	0.00	4.37	2.00	0.00	7.82	0.01	0.00
4.38	2.00	0.00	7.81	0.01	0.00	4.39	2.00	0.00	7.81	0.01	0.00
4.40	2.00	0.00	7.80	0.01	0.00	4.41	2.00	0.00	7.80	0.01	0.00
4.42	2.00	0.00	7.79	0.01	0.00	4.43	2.00	0.00	7.79	0.01	0.00
4.44	2.00	0.00	7.78	0.01	0.00	4.45	2.00	0.00	7.78	0.01	0.00
4.46	2.00	0.00	7.77	0.01	0.00	4.47	2.00	0.00	7.77	0.01	0.00
4.48	2.00	0.00	7.76	0.01	0.00	4.49	2.00	0.00	7.76	0.01	0.00
4.50	2.00	0.00	7.75	0.01	0.00	4.51	2.00	0.00	7.75	0.01	0.00
4.52	2.00	0.00	7.74	0.01	0.00	4.53	2.00	0.00	7.74	0.01	0.00
4.54	2.00	0.00	7.73	0.01	0.00	4.55	2.00	0.00	7.73	0.01	0.00
4.56	2.00	0.00	7.72	0.01	0.00	4.57	2.00	0.00	7.72	0.01	0.00
4.58	2.00	0.00	7.71	0.01	0.00	4.59	2.00	0.00	7.71	0.01	0.00
4.60	2.00	0.00	7.70	0.01	0.00	4.61	2.00	0.00	7.70	0.01	0.00
4.62	2.00	0.00	7.69	0.01	0.00	4.63	2.00	0.00	7.69	0.01	0.00
4.64	2.00	0.00	7.68	0.01	0.00	4.65	2.00	0.00	7.68	0.01	0.00
4.66	2.00	0.00	7.67	0.01	0.00	4.67	2.00	0.00	7.67	0.01	0.00
4.68	2.00	0.00	7.66	0.01	0.00	4.69	2.00	0.00	7.66	0.01	0.00
4.70	2.00	0.00	7.65	0.01	0.00	4.71	2.00	0.00	7.65	0.01	0.00
4.72	2.00	0.00	7.64	0.01	0.00	4.73	2.00	0.00	7.64	0.01	0.00
4.74	2.00	0.00	7.63	0.01	0.00	4.75	2.00	0.00	7.63	0.01	0.00
4.76	2.00	0.00	7.62	0.01	0.00	4.77	2.00	0.00	7.62	0.01	0.00
4.78	2.00	0.00	7.61	0.01	0.00	4.79	2.00	0.00	7.61	0.01	0.00
4.80	2.00	0.00	7.60	0.01	0.00	4.81	2.00	0.00	7.60	0.01	0.00
4.82	2.00	0.00	7.59	0.01	0.00	4.83	2.00	0.00	7.59	0.01	0.00
4.84	2.00	0.00	7.58	0.01	0.00	4.85	2.00	0.00	7.58	0.01	0.00
4.86	2.00	0.00	7.57	0.01	0.00	4.87	2.00	0.00	7.57	0.01	0.00
4.88	2.00	0.00	7.56	0.01	0.00	4.89	2.00	0.00	7.56	0.01	0.00
4.90	2.00	0.00	7.55	0.01	0.00	4.91	2.00	0.00	7.55	0.01	0.00
4.92	2.00	0.00	7.54	0.01	0.00	4.93	2.00	0.00	7.54	0.01	0.00
4.94	2.00	0.00	7.53	0.01	0.00	4.95	2.00	0.00	7.53	0.01	0.00
4.96	2.00	0.00	7.52	0.01	0.00	4.97	2.00	0.00	7.52	0.01	0.00
4.98	2.00	0.00	7.51	0.01	0.00	4.99	2.00	0.00	7.51	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
5.00	2.00	0.00	7.50	0.01	0.00	5.01	2.00	0.00	7.50	0.01	0.00
5.02	2.00	0.00	7.49	0.01	0.00	5.03	2.00	0.00	7.49	0.01	0.00
5.04	2.00	0.00	7.48	0.01	0.00	5.05	2.00	0.00	7.48	0.01	0.00
5.06	2.00	0.00	7.47	0.01	0.00	5.07	2.00	0.00	7.47	0.01	0.00
5.08	2.00	0.00	7.46	0.01	0.00	5.09	2.00	0.00	7.46	0.01	0.00
5.10	2.00	0.00	7.45	0.01	0.00	5.11	2.00	0.00	7.45	0.01	0.00
5.12	2.00	0.00	7.44	0.01	0.00	5.13	2.00	0.00	7.44	0.01	0.00
5.14	2.00	0.00	7.43	0.01	0.00	5.15	1.35	0.00	7.43	0.01	0.00
5.16	1.15	0.00	7.42	0.01	0.00	5.17	1.18	0.00	7.42	0.01	0.00
5.18	1.21	0.00	7.41	0.01	0.00	5.19	1.20	0.00	7.41	0.01	0.00
5.20	1.18	0.00	7.40	0.01	0.00	5.21	1.16	0.00	7.40	0.01	0.00
5.22	1.12	0.00	7.39	0.01	0.00	5.23	1.07	0.00	7.39	0.01	0.00
5.24	1.02	0.00	7.38	0.01	0.00	5.25	0.99	0.01	7.38	0.01	0.00
5.26	0.97	0.03	7.37	0.01	0.00	5.27	0.96	0.04	7.37	0.01	0.00
5.28	0.96	0.04	7.36	0.01	0.00	5.29	0.97	0.03	7.36	0.01	0.00
5.30	0.98	0.02	7.35	0.01	0.00	5.31	1.00	0.00	7.35	0.01	0.00
5.32	1.02	0.00	7.34	0.01	0.00	5.33	1.05	0.00	7.34	0.01	0.00
5.34	1.07	0.00	7.33	0.01	0.00	5.35	1.08	0.00	7.33	0.01	0.00
5.36	1.08	0.00	7.32	0.01	0.00	5.37	1.08	0.00	7.32	0.01	0.00
5.38	1.06	0.00	7.31	0.01	0.00	5.39	1.04	0.00	7.31	0.01	0.00
5.40	1.02	0.00	7.30	0.01	0.00	5.41	1.00	0.00	7.30	0.01	0.00
5.42	0.98	0.02	7.29	0.01	0.00	5.43	0.98	0.02	7.29	0.01	0.00
5.44	0.97	0.03	7.28	0.01	0.00	5.45	0.98	0.02	7.28	0.01	0.00
5.46	1.00	0.00	7.27	0.01	0.00	5.47	1.03	0.00	7.27	0.01	0.00
5.48	1.09	0.00	7.26	0.01	0.00	5.49	1.16	0.00	7.26	0.01	0.00
5.50	1.25	0.00	7.25	0.01	0.00	5.51	1.37	0.00	7.25	0.01	0.00
5.52	1.50	0.00	7.24	0.01	0.00	5.53	1.69	0.00	7.24	0.01	0.00
5.54	1.86	0.00	7.23	0.01	0.00	5.55	2.00	0.00	7.23	0.01	0.00
5.56	2.00	0.00	7.22	0.01	0.00	5.57	2.00	0.00	7.22	0.01	0.00
5.58	2.00	0.00	7.21	0.01	0.00	5.59	2.00	0.00	7.21	0.01	0.00
5.60	2.00	0.00	7.20	0.01	0.00	5.61	2.00	0.00	7.20	0.01	0.00
5.62	2.00	0.00	7.19	0.01	0.00	5.63	2.00	0.00	7.19	0.01	0.00
5.64	2.00	0.00	7.18	0.01	0.00	5.65	2.00	0.00	7.18	0.01	0.00
5.66	2.00	0.00	7.17	0.01	0.00	5.67	2.00	0.00	7.17	0.01	0.00
5.68	2.00	0.00	7.16	0.01	0.00	5.69	2.00	0.00	7.16	0.01	0.00
5.70	2.00	0.00	7.15	0.01	0.00	5.71	2.00	0.00	7.15	0.01	0.00
5.72	2.00	0.00	7.14	0.01	0.00	5.73	1.98	0.00	7.14	0.01	0.00
5.74	1.88	0.00	7.13	0.01	0.00	5.75	1.80	0.00	7.13	0.01	0.00
5.76	1.76	0.00	7.12	0.01	0.00	5.77	1.72	0.00	7.12	0.01	0.00
5.78	1.67	0.00	7.11	0.01	0.00	5.79	1.61	0.00	7.11	0.01	0.00
5.80	1.49	0.00	7.10	0.01	0.00	5.81	1.38	0.00	7.10	0.01	0.00
5.82	1.31	0.00	7.09	0.01	0.00	5.83	1.31	0.00	7.09	0.01	0.00
5.84	1.36	0.00	7.08	0.01	0.00	5.85	1.47	0.00	7.08	0.01	0.00
5.86	2.00	0.00	7.07	0.01	0.00	5.87	2.00	0.00	7.07	0.01	0.00
5.88	2.00	0.00	7.06	0.01	0.00	5.89	2.00	0.00	7.06	0.01	0.00
5.90	2.00	0.00	7.05	0.01	0.00	5.91	2.00	0.00	7.05	0.01	0.00
5.92	2.00	0.00	7.04	0.01	0.00	5.93	2.00	0.00	7.04	0.01	0.00
5.94	2.00	0.00	7.03	0.01	0.00	5.95	1.96	0.00	7.03	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
5.96	1.99	0.00	7.02	0.01	0.00	5.97	2.00	0.00	7.02	0.01	0.00
5.98	2.00	0.00	7.01	0.01	0.00	5.99	2.00	0.00	7.01	0.01	0.00
6.00	2.00	0.00	7.00	0.01	0.00	6.01	2.00	0.00	7.00	0.01	0.00
6.02	2.00	0.00	6.99	0.01	0.00	6.03	2.00	0.00	6.99	0.01	0.00
6.04	2.00	0.00	6.98	0.01	0.00	6.05	2.00	0.00	6.98	0.01	0.00
6.06	1.63	0.00	6.97	0.01	0.00	6.07	1.01	0.00	6.97	0.01	0.00
6.08	1.42	0.00	6.96	0.01	0.00	6.09	2.00	0.00	6.96	0.01	0.00
6.10	2.00	0.00	6.95	0.01	0.00	6.11	2.00	0.00	6.95	0.01	0.00
6.12	2.00	0.00	6.94	0.01	0.00	6.13	2.00	0.00	6.94	0.01	0.00
6.14	2.00	0.00	6.93	0.01	0.00	6.15	2.00	0.00	6.93	0.01	0.00
6.16	2.00	0.00	6.92	0.01	0.00	6.17	2.00	0.00	6.92	0.01	0.00
6.18	2.00	0.00	6.91	0.01	0.00	6.19	2.00	0.00	6.91	0.01	0.00
6.20	2.00	0.00	6.90	0.01	0.00	6.21	2.00	0.00	6.90	0.01	0.00
6.22	2.00	0.00	6.89	0.01	0.00	6.23	2.00	0.00	6.89	0.01	0.00
6.24	2.00	0.00	6.88	0.01	0.00	6.25	2.00	0.00	6.88	0.01	0.00
6.26	2.00	0.00	6.87	0.01	0.00	6.27	2.00	0.00	6.87	0.01	0.00
6.28	2.00	0.00	6.86	0.01	0.00	6.29	2.00	0.00	6.86	0.01	0.00
6.30	2.00	0.00	6.85	0.01	0.00	6.31	2.00	0.00	6.85	0.01	0.00
6.32	2.00	0.00	6.84	0.01	0.00	6.33	2.00	0.00	6.84	0.01	0.00
6.34	2.00	0.00	6.83	0.01	0.00	6.35	2.00	0.00	6.83	0.01	0.00
6.36	2.00	0.00	6.82	0.01	0.00	6.37	2.00	0.00	6.82	0.01	0.00
6.38	2.00	0.00	6.81	0.01	0.00	6.39	2.00	0.00	6.81	0.01	0.00
6.40	2.00	0.00	6.80	0.01	0.00	6.41	2.00	0.00	6.80	0.01	0.00
6.42	2.00	0.00	6.79	0.01	0.00	6.43	2.00	0.00	6.79	0.01	0.00
6.44	2.00	0.00	6.78	0.01	0.00	6.45	2.00	0.00	6.78	0.01	0.00
6.46	2.00	0.00	6.77	0.01	0.00	6.47	2.00	0.00	6.77	0.01	0.00
6.48	2.00	0.00	6.76	0.01	0.00	6.49	2.00	0.00	6.76	0.01	0.00
6.50	2.00	0.00	6.75	0.01	0.00	6.51	2.00	0.00	6.75	0.01	0.00
6.52	2.00	0.00	6.74	0.01	0.00	6.53	2.00	0.00	6.74	0.01	0.00
6.54	2.00	0.00	6.73	0.01	0.00	6.55	2.00	0.00	6.73	0.01	0.00
6.56	2.00	0.00	6.72	0.01	0.00	6.57	2.00	0.00	6.72	0.01	0.00
6.58	2.00	0.00	6.71	0.01	0.00	6.59	2.00	0.00	6.71	0.01	0.00
6.60	2.00	0.00	6.70	0.01	0.00	6.61	2.00	0.00	6.70	0.01	0.00
6.62	2.00	0.00	6.69	0.01	0.00	6.63	2.00	0.00	6.69	0.01	0.00
6.64	2.00	0.00	6.68	0.01	0.00	6.65	2.00	0.00	6.68	0.01	0.00
6.66	2.00	0.00	6.67	0.01	0.00	6.67	2.00	0.00	6.67	0.01	0.00
6.68	2.00	0.00	6.66	0.01	0.00	6.69	2.00	0.00	6.66	0.01	0.00
6.70	2.00	0.00	6.65	0.01	0.00	6.71	2.00	0.00	6.65	0.01	0.00
6.72	2.00	0.00	6.64	0.01	0.00	6.73	2.00	0.00	6.64	0.01	0.00
6.74	2.00	0.00	6.63	0.01	0.00	6.75	2.00	0.00	6.63	0.01	0.00
6.76	2.00	0.00	6.62	0.01	0.00	6.77	2.00	0.00	6.62	0.01	0.00
6.78	2.00	0.00	6.61	0.01	0.00	6.79	2.00	0.00	6.61	0.01	0.00
6.80	2.00	0.00	6.60	0.01	0.00	6.81	2.00	0.00	6.60	0.01	0.00
6.82	2.00	0.00	6.59	0.01	0.00	6.83	2.00	0.00	6.59	0.01	0.00
6.84	2.00	0.00	6.58	0.01	0.00	6.85	2.00	0.00	6.58	0.01	0.00
6.86	2.00	0.00	6.57	0.01	0.00	6.87	2.00	0.00	6.57	0.01	0.00
6.88	2.00	0.00	6.56	0.01	0.00	6.89	2.00	0.00	6.56	0.01	0.00
6.90	2.00	0.00	6.55	0.01	0.00	6.91	2.00	0.00	6.55	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
6.92	2.00	0.00	6.54	0.01	0.00	6.93	2.00	0.00	6.54	0.01	0.00
6.94	2.00	0.00	6.53	0.01	0.00	6.95	2.00	0.00	6.53	0.01	0.00
6.96	2.00	0.00	6.52	0.01	0.00	6.97	2.00	0.00	6.52	0.01	0.00
6.98	2.00	0.00	6.51	0.01	0.00	6.99	2.00	0.00	6.51	0.01	0.00
7.00	2.00	0.00	6.50	0.01	0.00	7.01	2.00	0.00	6.50	0.01	0.00
7.02	2.00	0.00	6.49	0.01	0.00	7.03	2.00	0.00	6.49	0.01	0.00
7.04	1.81	0.00	6.48	0.01	0.00	7.05	1.92	0.00	6.48	0.01	0.00
7.06	2.00	0.00	6.47	0.01	0.00	7.07	2.00	0.00	6.47	0.01	0.00
7.08	2.00	0.00	6.46	0.01	0.00	7.09	2.00	0.00	6.46	0.01	0.00
7.10	2.00	0.00	6.45	0.01	0.00	7.11	2.00	0.00	6.45	0.01	0.00
7.12	2.00	0.00	6.44	0.01	0.00	7.13	2.00	0.00	6.44	0.01	0.00
7.14	2.00	0.00	6.43	0.01	0.00	7.15	2.00	0.00	6.43	0.01	0.00
7.16	2.00	0.00	6.42	0.01	0.00	7.17	2.00	0.00	6.42	0.01	0.00
7.18	2.00	0.00	6.41	0.01	0.00	7.19	2.00	0.00	6.41	0.01	0.00
7.20	2.00	0.00	6.40	0.01	0.00	7.21	2.00	0.00	6.40	0.01	0.00
7.22	2.00	0.00	6.39	0.01	0.00	7.23	2.00	0.00	6.39	0.01	0.00
7.24	2.00	0.00	6.38	0.01	0.00	7.25	2.00	0.00	6.38	0.01	0.00
7.26	2.00	0.00	6.37	0.01	0.00	7.27	2.00	0.00	6.37	0.01	0.00
7.28	2.00	0.00	6.36	0.01	0.00	7.29	2.00	0.00	6.36	0.01	0.00
7.30	2.00	0.00	6.35	0.01	0.00	7.31	2.00	0.00	6.35	0.01	0.00
7.32	2.00	0.00	6.34	0.01	0.00	7.33	2.00	0.00	6.34	0.01	0.00
7.34	2.00	0.00	6.33	0.01	0.00	7.35	2.00	0.00	6.33	0.01	0.00
7.36	2.00	0.00	6.32	0.01	0.00	7.37	2.00	0.00	6.32	0.01	0.00
7.38	2.00	0.00	6.31	0.01	0.00	7.39	2.00	0.00	6.31	0.01	0.00
7.40	2.00	0.00	6.30	0.01	0.00	7.41	2.00	0.00	6.30	0.01	0.00
7.42	2.00	0.00	6.29	0.01	0.00	7.43	2.00	0.00	6.29	0.01	0.00
7.44	2.00	0.00	6.28	0.01	0.00	7.45	2.00	0.00	6.28	0.01	0.00
7.46	2.00	0.00	6.27	0.01	0.00	7.47	2.00	0.00	6.27	0.01	0.00
7.48	2.00	0.00	6.26	0.01	0.00	7.49	2.00	0.00	6.26	0.01	0.00
7.50	2.00	0.00	6.25	0.01	0.00	7.51	2.00	0.00	6.25	0.01	0.00
7.52	2.00	0.00	6.24	0.01	0.00	7.53	2.00	0.00	6.24	0.01	0.00
7.54	2.00	0.00	6.23	0.01	0.00	7.55	2.00	0.00	6.23	0.01	0.00
7.56	2.00	0.00	6.22	0.01	0.00	7.57	2.00	0.00	6.22	0.01	0.00
7.58	2.00	0.00	6.21	0.01	0.00	7.59	2.00	0.00	6.21	0.01	0.00
7.60	2.00	0.00	6.20	0.01	0.00	7.61	2.00	0.00	6.20	0.01	0.00
7.62	2.00	0.00	6.19	0.01	0.00	7.63	2.00	0.00	6.19	0.01	0.00
7.64	2.00	0.00	6.18	0.01	0.00	7.65	2.00	0.00	6.18	0.01	0.00
7.66	2.00	0.00	6.17	0.01	0.00	7.67	2.00	0.00	6.17	0.01	0.00
7.68	2.00	0.00	6.16	0.01	0.00	7.69	2.00	0.00	6.16	0.01	0.00
7.70	2.00	0.00	6.15	0.01	0.00	7.71	2.00	0.00	6.15	0.01	0.00
7.72	2.00	0.00	6.14	0.01	0.00	7.73	2.00	0.00	6.14	0.01	0.00
7.74	2.00	0.00	6.13	0.01	0.00	7.75	2.00	0.00	6.13	0.01	0.00
7.76	2.00	0.00	6.12	0.01	0.00	7.77	1.97	0.00	6.12	0.01	0.00
7.78	1.92	0.00	6.11	0.01	0.00	7.79	1.89	0.00	6.11	0.01	0.00
7.80	1.89	0.00	6.10	0.01	0.00	7.81	1.88	0.00	6.10	0.01	0.00
7.82	1.88	0.00	6.09	0.01	0.00	7.83	1.89	0.00	6.09	0.01	0.00
7.84	1.90	0.00	6.08	0.01	0.00	7.85	1.94	0.00	6.08	0.01	0.00
7.86	1.96	0.00	6.07	0.01	0.00	7.87	1.98	0.00	6.07	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
7.88	2.00	0.00	6.06	0.01	0.00	7.89	2.00	0.00	6.06	0.01	0.00
7.90	2.00	0.00	6.05	0.01	0.00	7.91	2.00	0.00	6.05	0.01	0.00
7.92	2.00	0.00	6.04	0.01	0.00	7.93	2.00	0.00	6.04	0.01	0.00
7.94	2.00	0.00	6.03	0.01	0.00	7.95	2.00	0.00	6.03	0.01	0.00
7.96	1.98	0.00	6.02	0.01	0.00	7.97	1.96	0.00	6.02	0.01	0.00
7.98	1.97	0.00	6.01	0.01	0.00	7.99	2.00	0.00	6.01	0.01	0.00
8.00	2.00	0.00	6.00	0.01	0.00	8.01	2.00	0.00	6.00	0.01	0.00
8.02	2.00	0.00	5.99	0.01	0.00	8.03	2.00	0.00	5.99	0.01	0.00
8.04	2.00	0.00	5.98	0.01	0.00	8.05	2.00	0.00	5.98	0.01	0.00
8.06	2.00	0.00	5.97	0.01	0.00	8.07	2.00	0.00	5.97	0.01	0.00
8.08	1.88	0.00	5.96	0.01	0.00	8.09	1.81	0.00	5.96	0.01	0.00
8.10	1.80	0.00	5.95	0.01	0.00	8.11	1.81	0.00	5.95	0.01	0.00
8.12	1.81	0.00	5.94	0.01	0.00	8.13	1.82	0.00	5.94	0.01	0.00
8.14	1.88	0.00	5.93	0.01	0.00	8.15	2.00	0.00	5.93	0.01	0.00
8.16	2.00	0.00	5.92	0.01	0.00	8.17	2.00	0.00	5.92	0.01	0.00
8.18	2.00	0.00	5.91	0.01	0.00	8.19	2.00	0.00	5.91	0.01	0.00
8.20	2.00	0.00	5.90	0.01	0.00	8.21	2.00	0.00	5.90	0.01	0.00
8.22	2.00	0.00	5.89	0.01	0.00	8.23	2.00	0.00	5.89	0.01	0.00
8.24	2.00	0.00	5.88	0.01	0.00	8.25	2.00	0.00	5.88	0.01	0.00
8.26	2.00	0.00	5.87	0.01	0.00	8.27	2.00	0.00	5.87	0.01	0.00
8.28	2.00	0.00	5.86	0.01	0.00	8.29	2.00	0.00	5.86	0.01	0.00
8.30	2.00	0.00	5.85	0.01	0.00	8.31	2.00	0.00	5.85	0.01	0.00
8.32	2.00	0.00	5.84	0.01	0.00	8.33	2.00	0.00	5.84	0.01	0.00
8.34	2.00	0.00	5.83	0.01	0.00	8.35	2.00	0.00	5.83	0.01	0.00
8.36	2.00	0.00	5.82	0.01	0.00	8.37	2.00	0.00	5.82	0.01	0.00
8.38	2.00	0.00	5.81	0.01	0.00	8.39	2.00	0.00	5.81	0.01	0.00
8.40	2.00	0.00	5.80	0.01	0.00	8.41	2.00	0.00	5.80	0.01	0.00
8.42	2.00	0.00	5.79	0.01	0.00	8.43	2.00	0.00	5.79	0.01	0.00
8.44	1.90	0.00	5.78	0.01	0.00	8.45	1.70	0.00	5.78	0.01	0.00
8.46	1.64	0.00	5.77	0.01	0.00	8.47	1.62	0.00	5.77	0.01	0.00
8.48	1.64	0.00	5.76	0.01	0.00	8.49	1.71	0.00	5.76	0.01	0.00
8.50	1.84	0.00	5.75	0.01	0.00	8.51	1.97	0.00	5.75	0.01	0.00
8.52	2.00	0.00	5.74	0.01	0.00	8.53	2.00	0.00	5.74	0.01	0.00
8.54	2.00	0.00	5.73	0.01	0.00	8.55	2.00	0.00	5.72	0.01	0.00
8.56	2.00	0.00	5.72	0.01	0.00	8.57	2.00	0.00	5.72	0.01	0.00
8.58	2.00	0.00	5.71	0.01	0.00	8.59	2.00	0.00	5.71	0.01	0.00
8.60	2.00	0.00	5.70	0.01	0.00	8.61	2.00	0.00	5.70	0.01	0.00
8.62	2.00	0.00	5.69	0.01	0.00	8.63	2.00	0.00	5.68	0.01	0.00
8.64	2.00	0.00	5.68	0.01	0.00	8.65	2.00	0.00	5.68	0.01	0.00
8.66	2.00	0.00	5.67	0.01	0.00	8.67	2.00	0.00	5.67	0.01	0.00
8.68	2.00	0.00	5.66	0.01	0.00	8.69	2.00	0.00	5.66	0.01	0.00
8.70	2.00	0.00	5.65	0.01	0.00	8.71	2.00	0.00	5.64	0.01	0.00
8.72	2.00	0.00	5.64	0.01	0.00	8.73	2.00	0.00	5.64	0.01	0.00
8.74	2.00	0.00	5.63	0.01	0.00	8.75	2.00	0.00	5.63	0.01	0.00
8.76	2.00	0.00	5.62	0.01	0.00	8.77	2.00	0.00	5.62	0.01	0.00
8.78	2.00	0.00	5.61	0.01	0.00	8.79	2.00	0.00	5.61	0.01	0.00
8.80	2.00	0.00	5.60	0.01	0.00	8.81	2.00	0.00	5.60	0.01	0.00
8.82	2.00	0.00	5.59	0.01	0.00	8.83	2.00	0.00	5.59	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
8.84	2.00	0.00	5.58	0.01	0.00	8.85	2.00	0.00	5.58	0.01	0.00
8.86	2.00	0.00	5.57	0.01	0.00	8.87	2.00	0.00	5.57	0.01	0.00
8.88	2.00	0.00	5.56	0.01	0.00	8.89	2.00	0.00	5.56	0.01	0.00
8.90	2.00	0.00	5.55	0.01	0.00	8.91	2.00	0.00	5.55	0.01	0.00
8.92	2.00	0.00	5.54	0.01	0.00	8.93	2.00	0.00	5.54	0.01	0.00
8.94	2.00	0.00	5.53	0.01	0.00	8.95	2.00	0.00	5.53	0.01	0.00
8.96	2.00	0.00	5.52	0.01	0.00	8.97	2.00	0.00	5.52	0.01	0.00
8.98	2.00	0.00	5.51	0.01	0.00	8.99	2.00	0.00	5.51	0.01	0.00
9.00	2.00	0.00	5.50	0.01	0.00	9.01	2.00	0.00	5.50	0.01	0.00
9.02	2.00	0.00	5.49	0.01	0.00	9.03	2.00	0.00	5.49	0.01	0.00
9.04	2.00	0.00	5.48	0.01	0.00	9.05	2.00	0.00	5.47	0.01	0.00
9.06	2.00	0.00	5.47	0.01	0.00	9.07	2.00	0.00	5.47	0.01	0.00
9.08	2.00	0.00	5.46	0.01	0.00	9.09	2.00	0.00	5.46	0.01	0.00
9.10	2.00	0.00	5.45	0.01	0.00	9.11	2.00	0.00	5.45	0.01	0.00
9.12	2.00	0.00	5.44	0.01	0.00	9.13	2.00	0.00	5.43	0.01	0.00
9.14	2.00	0.00	5.43	0.01	0.00	9.15	2.00	0.00	5.43	0.01	0.00
9.16	2.00	0.00	5.42	0.01	0.00	9.17	2.00	0.00	5.42	0.01	0.00
9.18	2.00	0.00	5.41	0.01	0.00	9.19	2.00	0.00	5.41	0.01	0.00
9.20	2.00	0.00	5.40	0.01	0.00	9.21	2.00	0.00	5.39	0.01	0.00
9.22	2.00	0.00	5.39	0.01	0.00	9.23	2.00	0.00	5.39	0.01	0.00
9.24	2.00	0.00	5.38	0.01	0.00	9.25	2.00	0.00	5.38	0.01	0.00
9.26	2.00	0.00	5.37	0.01	0.00	9.27	2.00	0.00	5.37	0.01	0.00
9.28	2.00	0.00	5.36	0.01	0.00	9.29	2.00	0.00	5.36	0.01	0.00
9.30	2.00	0.00	5.35	0.01	0.00	9.31	2.00	0.00	5.35	0.01	0.00
9.32	2.00	0.00	5.34	0.01	0.00	9.33	2.00	0.00	5.34	0.01	0.00
9.34	2.00	0.00	5.33	0.01	0.00	9.35	2.00	0.00	5.33	0.01	0.00
9.36	2.00	0.00	5.32	0.01	0.00	9.37	2.00	0.00	5.32	0.01	0.00
9.38	2.00	0.00	5.31	0.01	0.00	9.39	2.00	0.00	5.31	0.01	0.00
9.40	2.00	0.00	5.30	0.01	0.00	9.41	2.00	0.00	5.30	0.01	0.00
9.42	2.00	0.00	5.29	0.01	0.00	9.43	2.00	0.00	5.29	0.01	0.00
9.44	2.00	0.00	5.28	0.01	0.00	9.45	2.00	0.00	5.28	0.01	0.00
9.46	2.00	0.00	5.27	0.01	0.00	9.47	2.00	0.00	5.27	0.01	0.00
9.48	2.00	0.00	5.26	0.01	0.00	9.49	2.00	0.00	5.26	0.01	0.00
9.50	2.00	0.00	5.25	0.01	0.00	9.51	2.00	0.00	5.25	0.01	0.00
9.52	2.00	0.00	5.24	0.01	0.00	9.53	2.00	0.00	5.24	0.01	0.00
9.54	2.00	0.00	5.23	0.01	0.00	9.55	2.00	0.00	5.22	0.01	0.00
9.56	2.00	0.00	5.22	0.01	0.00	9.57	2.00	0.00	5.22	0.01	0.00
9.58	2.00	0.00	5.21	0.01	0.00	9.59	2.00	0.00	5.21	0.01	0.00
9.60	2.00	0.00	5.20	0.01	0.00	9.61	2.00	0.00	5.20	0.01	0.00
9.62	2.00	0.00	5.19	0.01	0.00	9.63	2.00	0.00	5.18	0.01	0.00
9.64	2.00	0.00	5.18	0.01	0.00	9.65	2.00	0.00	5.18	0.01	0.00
9.66	2.00	0.00	5.17	0.01	0.00	9.67	2.00	0.00	5.17	0.01	0.00
9.68	2.00	0.00	5.16	0.01	0.00	9.69	2.00	0.00	5.16	0.01	0.00
9.70	2.00	0.00	5.15	0.01	0.00	9.71	2.00	0.00	5.14	0.01	0.00
9.72	2.00	0.00	5.14	0.01	0.00	9.73	2.00	0.00	5.14	0.01	0.00
9.74	2.00	0.00	5.13	0.01	0.00	9.75	2.00	0.00	5.13	0.01	0.00
9.76	2.00	0.00	5.12	0.01	0.00	9.77	2.00	0.00	5.12	0.01	0.00
9.78	2.00	0.00	5.11	0.01	0.00	9.79	2.00	0.00	5.11	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
9.80	2.00	0.00	5.10	0.01	0.00	9.81	2.00	0.00	5.10	0.01	0.00
9.82	2.00	0.00	5.09	0.01	0.00	9.83	2.00	0.00	5.09	0.01	0.00
9.84	2.00	0.00	5.08	0.01	0.00	9.85	2.00	0.00	5.08	0.01	0.00
9.86	2.00	0.00	5.07	0.01	0.00	9.87	2.00	0.00	5.07	0.01	0.00
9.88	2.00	0.00	5.06	0.01	0.00	9.89	2.00	0.00	5.06	0.01	0.00
9.90	2.00	0.00	5.05	0.01	0.00	9.91	2.00	0.00	5.05	0.01	0.00
9.92	2.00	0.00	5.04	0.01	0.00	9.93	2.00	0.00	5.04	0.01	0.00
9.94	2.00	0.00	5.03	0.01	0.00	9.95	2.00	0.00	5.03	0.01	0.00
9.96	2.00	0.00	5.02	0.01	0.00	9.97	2.00	0.00	5.02	0.01	0.00
9.98	2.00	0.00	5.01	0.01	0.00	9.99	2.00	0.00	5.01	0.01	0.00
10.00	2.00	0.00	5.00	0.01	0.00	10.01	2.00	0.00	5.00	0.01	0.00
10.02	2.00	0.00	4.99	0.01	0.00	10.03	2.00	0.00	4.99	0.01	0.00
10.04	2.00	0.00	4.98	0.01	0.00	10.05	2.00	0.00	4.97	0.01	0.00
10.06	2.00	0.00	4.97	0.01	0.00	10.07	2.00	0.00	4.97	0.01	0.00
10.08	2.00	0.00	4.96	0.01	0.00	10.09	2.00	0.00	4.96	0.01	0.00
10.10	2.00	0.00	4.95	0.01	0.00	10.11	2.00	0.00	4.95	0.01	0.00
10.12	2.00	0.00	4.94	0.01	0.00	10.13	2.00	0.00	4.93	0.01	0.00
10.14	2.00	0.00	4.93	0.01	0.00	10.15	2.00	0.00	4.93	0.01	0.00
10.16	2.00	0.00	4.92	0.01	0.00	10.17	2.00	0.00	4.92	0.01	0.00
10.18	2.00	0.00	4.91	0.01	0.00	10.19	2.00	0.00	4.91	0.01	0.00
10.20	2.00	0.00	4.90	0.01	0.00	10.21	2.00	0.00	4.89	0.01	0.00
10.22	2.00	0.00	4.89	0.01	0.00	10.23	2.00	0.00	4.89	0.01	0.00
10.24	2.00	0.00	4.88	0.01	0.00	10.25	2.00	0.00	4.88	0.01	0.00
10.26	2.00	0.00	4.87	0.01	0.00	10.27	2.00	0.00	4.87	0.01	0.00
10.28	2.00	0.00	4.86	0.01	0.00	10.29	2.00	0.00	4.86	0.01	0.00
10.30	2.00	0.00	4.85	0.01	0.00	10.31	2.00	0.00	4.85	0.01	0.00
10.32	2.00	0.00	4.84	0.01	0.00	10.33	2.00	0.00	4.84	0.01	0.00
10.34	2.00	0.00	4.83	0.01	0.00	10.35	2.00	0.00	4.83	0.01	0.00
10.36	2.00	0.00	4.82	0.01	0.00	10.37	2.00	0.00	4.82	0.01	0.00
10.38	2.00	0.00	4.81	0.01	0.00	10.39	2.00	0.00	4.81	0.01	0.00
10.40	2.00	0.00	4.80	0.01	0.00	10.41	2.00	0.00	4.80	0.01	0.00
10.42	2.00	0.00	4.79	0.01	0.00	10.43	2.00	0.00	4.79	0.01	0.00
10.44	2.00	0.00	4.78	0.01	0.00	10.45	2.00	0.00	4.78	0.01	0.00
10.46	2.00	0.00	4.77	0.01	0.00	10.47	2.00	0.00	4.77	0.01	0.00
10.48	2.00	0.00	4.76	0.01	0.00	10.49	2.00	0.00	4.76	0.01	0.00
10.50	2.00	0.00	4.75	0.01	0.00	10.51	2.00	0.00	4.75	0.01	0.00
10.52	2.00	0.00	4.74	0.01	0.00	10.53	2.00	0.00	4.74	0.01	0.00
10.54	2.00	0.00	4.73	0.01	0.00	10.55	2.00	0.00	4.72	0.01	0.00
10.56	2.00	0.00	4.72	0.01	0.00	10.57	2.00	0.00	4.72	0.01	0.00
10.58	2.00	0.00	4.71	0.01	0.00	10.59	2.00	0.00	4.71	0.01	0.00
10.60	2.00	0.00	4.70	0.01	0.00	10.61	2.00	0.00	4.70	0.01	0.00
10.62	2.00	0.00	4.69	0.01	0.00	10.63	2.00	0.00	4.68	0.01	0.00
10.64	2.00	0.00	4.68	0.01	0.00	10.65	2.00	0.00	4.68	0.01	0.00
10.66	2.00	0.00	4.67	0.01	0.00	10.67	2.00	0.00	4.67	0.01	0.00
10.68	2.00	0.00	4.66	0.01	0.00	10.69	2.00	0.00	4.66	0.01	0.00
10.70	2.00	0.00	4.65	0.01	0.00	10.71	2.00	0.00	4.64	0.01	0.00
10.72	2.00	0.00	4.64	0.01	0.00	10.73	2.00	0.00	4.64	0.01	0.00
10.74	2.00	0.00	4.63	0.01	0.00	10.75	2.00	0.00	4.63	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
10.76	2.00	0.00	4.62	0.01	0.00	10.77	2.00	0.00	4.62	0.01	0.00
10.78	2.00	0.00	4.61	0.01	0.00	10.79	2.00	0.00	4.61	0.01	0.00
10.80	2.00	0.00	4.60	0.01	0.00	10.81	2.00	0.00	4.60	0.01	0.00
10.82	2.00	0.00	4.59	0.01	0.00	10.83	2.00	0.00	4.59	0.01	0.00
10.84	2.00	0.00	4.58	0.01	0.00	10.85	2.00	0.00	4.58	0.01	0.00
10.86	2.00	0.00	4.57	0.01	0.00	10.87	2.00	0.00	4.57	0.01	0.00
10.88	2.00	0.00	4.56	0.01	0.00	10.89	2.00	0.00	4.56	0.01	0.00
10.90	2.00	0.00	4.55	0.01	0.00	10.91	2.00	0.00	4.55	0.01	0.00
10.92	2.00	0.00	4.54	0.01	0.00	10.93	2.00	0.00	4.54	0.01	0.00
10.94	2.00	0.00	4.53	0.01	0.00	10.95	2.00	0.00	4.53	0.01	0.00
10.96	2.00	0.00	4.52	0.01	0.00	10.97	2.00	0.00	4.52	0.01	0.00
10.98	2.00	0.00	4.51	0.01	0.00	10.99	2.00	0.00	4.51	0.01	0.00
11.00	2.00	0.00	4.50	0.01	0.00	11.01	2.00	0.00	4.50	0.01	0.00
11.02	2.00	0.00	4.49	0.01	0.00	11.03	2.00	0.00	4.49	0.01	0.00
11.04	2.00	0.00	4.48	0.01	0.00	11.05	2.00	0.00	4.47	0.01	0.00
11.06	2.00	0.00	4.47	0.01	0.00	11.07	2.00	0.00	4.47	0.01	0.00
11.08	2.00	0.00	4.46	0.01	0.00	11.09	2.00	0.00	4.46	0.01	0.00
11.10	2.00	0.00	4.45	0.01	0.00	11.11	2.00	0.00	4.45	0.01	0.00
11.12	2.00	0.00	4.44	0.01	0.00	11.13	2.00	0.00	4.43	0.01	0.00
11.14	2.00	0.00	4.43	0.01	0.00	11.15	2.00	0.00	4.43	0.01	0.00
11.16	2.00	0.00	4.42	0.01	0.00	11.17	2.00	0.00	4.42	0.01	0.00
11.18	2.00	0.00	4.41	0.01	0.00	11.19	2.00	0.00	4.41	0.01	0.00
11.20	2.00	0.00	4.40	0.01	0.00	11.21	2.00	0.00	4.39	0.01	0.00
11.22	2.00	0.00	4.39	0.01	0.00	11.23	2.00	0.00	4.39	0.01	0.00
11.24	2.00	0.00	4.38	0.01	0.00	11.25	2.00	0.00	4.38	0.01	0.00
11.26	2.00	0.00	4.37	0.01	0.00	11.27	2.00	0.00	4.37	0.01	0.00
11.28	2.00	0.00	4.36	0.01	0.00	11.29	2.00	0.00	4.36	0.01	0.00
11.30	2.00	0.00	4.35	0.01	0.00	11.31	2.00	0.00	4.35	0.01	0.00
11.32	2.00	0.00	4.34	0.01	0.00	11.33	2.00	0.00	4.34	0.01	0.00
11.34	2.00	0.00	4.33	0.01	0.00	11.35	2.00	0.00	4.33	0.01	0.00
11.36	2.00	0.00	4.32	0.01	0.00	11.37	2.00	0.00	4.32	0.01	0.00
11.38	2.00	0.00	4.31	0.01	0.00	11.39	2.00	0.00	4.31	0.01	0.00
11.40	1.98	0.00	4.30	0.01	0.00	11.41	1.96	0.00	4.30	0.01	0.00
11.42	1.95	0.00	4.29	0.01	0.00	11.43	1.96	0.00	4.29	0.01	0.00
11.44	1.97	0.00	4.28	0.01	0.00	11.45	1.98	0.00	4.28	0.01	0.00
11.46	2.00	0.00	4.27	0.01	0.00	11.47	2.00	0.00	4.27	0.01	0.00
11.48	2.00	0.00	4.26	0.01	0.00	11.49	2.00	0.00	4.26	0.01	0.00
11.50	2.00	0.00	4.25	0.01	0.00	11.51	2.00	0.00	4.25	0.01	0.00
11.52	2.00	0.00	4.24	0.01	0.00	11.53	2.00	0.00	4.24	0.01	0.00
11.54	2.00	0.00	4.23	0.01	0.00	11.55	2.00	0.00	4.22	0.01	0.00
11.56	2.00	0.00	4.22	0.01	0.00	11.57	2.00	0.00	4.22	0.01	0.00
11.58	2.00	0.00	4.21	0.01	0.00	11.59	2.00	0.00	4.21	0.01	0.00
11.60	2.00	0.00	4.20	0.01	0.00	11.61	2.00	0.00	4.20	0.01	0.00
11.62	2.00	0.00	4.19	0.01	0.00	11.63	2.00	0.00	4.18	0.01	0.00
11.64	2.00	0.00	4.18	0.01	0.00	11.65	2.00	0.00	4.18	0.01	0.00
11.66	2.00	0.00	4.17	0.01	0.00	11.67	2.00	0.00	4.17	0.01	0.00
11.68	2.00	0.00	4.16	0.01	0.00	11.69	2.00	0.00	4.16	0.01	0.00
11.70	2.00	0.00	4.15	0.01	0.00	11.71	2.00	0.00	4.14	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
11.72	2.00	0.00	4.14	0.01	0.00	11.73	2.00	0.00	4.14	0.01	0.00
11.74	2.00	0.00	4.13	0.01	0.00	11.75	2.00	0.00	4.13	0.01	0.00
11.76	2.00	0.00	4.12	0.01	0.00	11.77	2.00	0.00	4.12	0.01	0.00
11.78	2.00	0.00	4.11	0.01	0.00	11.79	1.99	0.00	4.11	0.01	0.00
11.80	1.91	0.00	4.10	0.01	0.00	11.81	2.00	0.00	4.10	0.01	0.00
11.82	2.00	0.00	4.09	0.01	0.00	11.83	2.00	0.00	4.09	0.01	0.00
11.84	2.00	0.00	4.08	0.01	0.00	11.85	2.00	0.00	4.08	0.01	0.00
11.86	2.00	0.00	4.07	0.01	0.00	11.87	2.00	0.00	4.07	0.01	0.00
11.88	2.00	0.00	4.06	0.01	0.00	11.89	2.00	0.00	4.06	0.01	0.00
11.90	2.00	0.00	4.05	0.01	0.00	11.91	2.00	0.00	4.05	0.01	0.00
11.92	2.00	0.00	4.04	0.01	0.00	11.93	2.00	0.00	4.04	0.01	0.00
11.94	2.00	0.00	4.03	0.01	0.00	11.95	2.00	0.00	4.03	0.01	0.00
11.96	2.00	0.00	4.02	0.01	0.00	11.97	2.00	0.00	4.02	0.01	0.00
11.98	2.00	0.00	4.01	0.01	0.00	11.99	2.00	0.00	4.01	0.01	0.00
12.00	2.00	0.00	4.00	0.01	0.00	12.01	2.00	0.00	4.00	0.01	0.00
12.02	2.00	0.00	3.99	0.01	0.00	12.03	2.00	0.00	3.99	0.01	0.00
12.04	2.00	0.00	3.98	0.01	0.00	12.05	2.00	0.00	3.98	0.01	0.00
12.06	2.00	0.00	3.97	0.01	0.00	12.07	2.00	0.00	3.97	0.01	0.00
12.08	2.00	0.00	3.96	0.01	0.00	12.09	2.00	0.00	3.96	0.01	0.00
12.10	2.00	0.00	3.95	0.01	0.00	12.11	2.00	0.00	3.95	0.01	0.00
12.12	2.00	0.00	3.94	0.01	0.00	12.13	2.00	0.00	3.94	0.01	0.00
12.14	2.00	0.00	3.93	0.01	0.00	12.15	2.00	0.00	3.93	0.01	0.00
12.16	2.00	0.00	3.92	0.01	0.00	12.17	2.00	0.00	3.92	0.01	0.00
12.18	2.00	0.00	3.91	0.01	0.00	12.19	2.00	0.00	3.91	0.01	0.00
12.20	2.00	0.00	3.90	0.01	0.00	12.21	2.00	0.00	3.90	0.01	0.00
12.22	2.00	0.00	3.89	0.01	0.00	12.23	2.00	0.00	3.89	0.01	0.00
12.24	2.00	0.00	3.88	0.01	0.00	12.25	2.00	0.00	3.88	0.01	0.00
12.26	2.00	0.00	3.87	0.01	0.00	12.27	2.00	0.00	3.87	0.01	0.00
12.28	2.00	0.00	3.86	0.01	0.00	12.29	2.00	0.00	3.86	0.01	0.00
12.30	2.00	0.00	3.85	0.01	0.00	12.31	2.00	0.00	3.85	0.01	0.00
12.32	2.00	0.00	3.84	0.01	0.00	12.33	2.00	0.00	3.84	0.01	0.00
12.34	2.00	0.00	3.83	0.01	0.00	12.35	2.00	0.00	3.83	0.01	0.00
12.36	2.00	0.00	3.82	0.01	0.00	12.37	2.00	0.00	3.82	0.01	0.00
12.38	2.00	0.00	3.81	0.01	0.00	12.39	2.00	0.00	3.81	0.01	0.00
12.40	2.00	0.00	3.80	0.01	0.00	12.41	2.00	0.00	3.80	0.01	0.00
12.42	2.00	0.00	3.79	0.01	0.00	12.43	2.00	0.00	3.79	0.01	0.00
12.44	2.00	0.00	3.78	0.01	0.00	12.45	2.00	0.00	3.78	0.01	0.00
12.46	2.00	0.00	3.77	0.01	0.00	12.47	2.00	0.00	3.77	0.01	0.00
12.48	2.00	0.00	3.76	0.01	0.00	12.49	2.00	0.00	3.76	0.01	0.00
12.50	2.00	0.00	3.75	0.01	0.00	12.51	2.00	0.00	3.75	0.01	0.00
12.52	2.00	0.00	3.74	0.01	0.00	12.53	2.00	0.00	3.74	0.01	0.00
12.54	2.00	0.00	3.73	0.01	0.00	12.55	2.00	0.00	3.73	0.01	0.00
12.56	2.00	0.00	3.72	0.01	0.00	12.57	2.00	0.00	3.72	0.01	0.00
12.58	2.00	0.00	3.71	0.01	0.00	12.59	2.00	0.00	3.71	0.01	0.00
12.60	2.00	0.00	3.70	0.01	0.00	12.61	2.00	0.00	3.70	0.01	0.00
12.62	2.00	0.00	3.69	0.01	0.00	12.63	2.00	0.00	3.69	0.01	0.00
12.64	2.00	0.00	3.68	0.01	0.00	12.65	2.00	0.00	3.68	0.01	0.00
12.66	2.00	0.00	3.67	0.01	0.00	12.67	2.00	0.00	3.67	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
12.68	2.00	0.00	3.66	0.01	0.00	12.69	2.00	0.00	3.66	0.01	0.00
12.70	2.00	0.00	3.65	0.01	0.00	12.71	2.00	0.00	3.65	0.01	0.00
12.72	2.00	0.00	3.64	0.01	0.00	12.73	2.00	0.00	3.64	0.01	0.00
12.74	2.00	0.00	3.63	0.01	0.00	12.75	2.00	0.00	3.63	0.01	0.00
12.76	2.00	0.00	3.62	0.01	0.00	12.77	2.00	0.00	3.62	0.01	0.00
12.78	2.00	0.00	3.61	0.01	0.00	12.79	2.00	0.00	3.61	0.01	0.00
12.80	2.00	0.00	3.60	0.01	0.00	12.81	2.00	0.00	3.60	0.01	0.00
12.82	2.00	0.00	3.59	0.01	0.00	12.83	2.00	0.00	3.59	0.01	0.00
12.84	2.00	0.00	3.58	0.01	0.00	12.85	2.00	0.00	3.58	0.01	0.00
12.86	2.00	0.00	3.57	0.01	0.00	12.87	2.00	0.00	3.57	0.01	0.00
12.88	2.00	0.00	3.56	0.01	0.00	12.89	2.00	0.00	3.56	0.01	0.00
12.90	2.00	0.00	3.55	0.01	0.00	12.91	2.00	0.00	3.55	0.01	0.00
12.92	2.00	0.00	3.54	0.01	0.00	12.93	2.00	0.00	3.54	0.01	0.00
12.94	2.00	0.00	3.53	0.01	0.00	12.95	2.00	0.00	3.53	0.01	0.00
12.96	2.00	0.00	3.52	0.01	0.00	12.97	2.00	0.00	3.52	0.01	0.00
12.98	2.00	0.00	3.51	0.01	0.00	12.99	2.00	0.00	3.51	0.01	0.00
13.00	2.00	0.00	3.50	0.01	0.00	13.01	2.00	0.00	3.50	0.01	0.00
13.02	2.00	0.00	3.49	0.01	0.00	13.03	2.00	0.00	3.49	0.01	0.00
13.04	2.00	0.00	3.48	0.01	0.00	13.05	2.00	0.00	3.48	0.01	0.00
13.06	2.00	0.00	3.47	0.01	0.00	13.07	2.00	0.00	3.47	0.01	0.00
13.08	2.00	0.00	3.46	0.01	0.00	13.09	2.00	0.00	3.46	0.01	0.00
13.10	2.00	0.00	3.45	0.01	0.00	13.11	2.00	0.00	3.45	0.01	0.00
13.12	2.00	0.00	3.44	0.01	0.00	13.13	2.00	0.00	3.44	0.01	0.00
13.14	2.00	0.00	3.43	0.01	0.00	13.15	2.00	0.00	3.43	0.01	0.00
13.16	2.00	0.00	3.42	0.01	0.00	13.17	2.00	0.00	3.42	0.01	0.00
13.18	2.00	0.00	3.41	0.01	0.00	13.19	2.00	0.00	3.41	0.01	0.00
13.20	2.00	0.00	3.40	0.01	0.00	13.21	2.00	0.00	3.40	0.01	0.00
13.22	2.00	0.00	3.39	0.01	0.00	13.23	2.00	0.00	3.39	0.01	0.00
13.24	2.00	0.00	3.38	0.01	0.00	13.25	2.00	0.00	3.38	0.01	0.00
13.26	2.00	0.00	3.37	0.01	0.00	13.27	2.00	0.00	3.37	0.01	0.00
13.28	2.00	0.00	3.36	0.01	0.00	13.29	2.00	0.00	3.36	0.01	0.00
13.30	2.00	0.00	3.35	0.01	0.00	13.31	2.00	0.00	3.35	0.01	0.00
13.32	2.00	0.00	3.34	0.01	0.00	13.33	2.00	0.00	3.34	0.01	0.00
13.34	2.00	0.00	3.33	0.01	0.00	13.35	2.00	0.00	3.33	0.01	0.00
13.36	2.00	0.00	3.32	0.01	0.00	13.37	2.00	0.00	3.32	0.01	0.00
13.38	2.00	0.00	3.31	0.01	0.00	13.39	2.00	0.00	3.31	0.01	0.00
13.40	2.00	0.00	3.30	0.01	0.00	13.41	2.00	0.00	3.30	0.01	0.00
13.42	2.00	0.00	3.29	0.01	0.00	13.43	2.00	0.00	3.29	0.01	0.00
13.44	2.00	0.00	3.28	0.01	0.00	13.45	2.00	0.00	3.28	0.01	0.00
13.46	2.00	0.00	3.27	0.01	0.00	13.47	2.00	0.00	3.27	0.01	0.00
13.48	2.00	0.00	3.26	0.01	0.00	13.49	2.00	0.00	3.26	0.01	0.00
13.50	2.00	0.00	3.25	0.01	0.00	13.51	2.00	0.00	3.25	0.01	0.00
13.52	2.00	0.00	3.24	0.01	0.00	13.53	2.00	0.00	3.24	0.01	0.00
13.54	2.00	0.00	3.23	0.01	0.00	13.55	2.00	0.00	3.23	0.01	0.00
13.56	2.00	0.00	3.22	0.01	0.00	13.57	2.00	0.00	3.22	0.01	0.00
13.58	2.00	0.00	3.21	0.01	0.00	13.59	2.00	0.00	3.21	0.01	0.00
13.60	2.00	0.00	3.20	0.01	0.00	13.61	2.00	0.00	3.20	0.01	0.00
13.62	2.00	0.00	3.19	0.01	0.00	13.63	2.00	0.00	3.19	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
13.64	2.00	0.00	3.18	0.01	0.00	13.65	2.00	0.00	3.18	0.01	0.00
13.66	2.00	0.00	3.17	0.01	0.00	13.67	2.00	0.00	3.17	0.01	0.00
13.68	2.00	0.00	3.16	0.01	0.00	13.69	2.00	0.00	3.16	0.01	0.00
13.70	2.00	0.00	3.15	0.01	0.00	13.71	2.00	0.00	3.15	0.01	0.00
13.72	2.00	0.00	3.14	0.01	0.00	13.73	2.00	0.00	3.14	0.01	0.00
13.74	2.00	0.00	3.13	0.01	0.00	13.75	2.00	0.00	3.13	0.01	0.00
13.76	2.00	0.00	3.12	0.01	0.00	13.77	2.00	0.00	3.12	0.01	0.00
13.78	2.00	0.00	3.11	0.01	0.00	13.79	2.00	0.00	3.11	0.01	0.00
13.80	2.00	0.00	3.10	0.01	0.00	13.81	2.00	0.00	3.10	0.01	0.00
13.82	2.00	0.00	3.09	0.01	0.00	13.83	2.00	0.00	3.09	0.01	0.00
13.84	2.00	0.00	3.08	0.01	0.00	13.85	2.00	0.00	3.08	0.01	0.00
13.86	2.00	0.00	3.07	0.01	0.00	13.87	2.00	0.00	3.07	0.01	0.00
13.88	2.00	0.00	3.06	0.01	0.00	13.89	2.00	0.00	3.06	0.01	0.00
13.90	2.00	0.00	3.05	0.01	0.00	13.91	2.00	0.00	3.05	0.01	0.00
13.92	2.00	0.00	3.04	0.01	0.00	13.93	2.00	0.00	3.04	0.01	0.00
13.94	2.00	0.00	3.03	0.01	0.00	13.95	2.00	0.00	3.03	0.01	0.00
13.96	2.00	0.00	3.02	0.01	0.00	13.97	2.00	0.00	3.02	0.01	0.00
13.98	2.00	0.00	3.01	0.01	0.00	13.99	2.00	0.00	3.01	0.01	0.00
14.00	2.00	0.00	3.00	0.01	0.00	14.01	2.00	0.00	3.00	0.01	0.00
14.02	2.00	0.00	2.99	0.01	0.00	14.03	2.00	0.00	2.99	0.01	0.00
14.04	2.00	0.00	2.98	0.01	0.00	14.05	2.00	0.00	2.98	0.01	0.00
14.06	2.00	0.00	2.97	0.01	0.00	14.07	2.00	0.00	2.97	0.01	0.00
14.08	2.00	0.00	2.96	0.01	0.00	14.09	2.00	0.00	2.96	0.01	0.00
14.10	2.00	0.00	2.95	0.01	0.00	14.11	2.00	0.00	2.95	0.01	0.00
14.12	2.00	0.00	2.94	0.01	0.00	14.13	2.00	0.00	2.94	0.01	0.00
14.14	2.00	0.00	2.93	0.01	0.00	14.15	2.00	0.00	2.93	0.01	0.00
14.16	2.00	0.00	2.92	0.01	0.00	14.17	2.00	0.00	2.92	0.01	0.00
14.18	2.00	0.00	2.91	0.01	0.00	14.19	2.00	0.00	2.91	0.01	0.00
14.20	2.00	0.00	2.90	0.01	0.00	14.21	2.00	0.00	2.90	0.01	0.00
14.22	2.00	0.00	2.89	0.01	0.00	14.23	2.00	0.00	2.89	0.01	0.00
14.24	2.00	0.00	2.88	0.01	0.00	14.25	2.00	0.00	2.88	0.01	0.00
14.26	2.00	0.00	2.87	0.01	0.00	14.27	2.00	0.00	2.87	0.01	0.00
14.28	2.00	0.00	2.86	0.01	0.00	14.29	2.00	0.00	2.86	0.01	0.00
14.30	2.00	0.00	2.85	0.01	0.00	14.31	2.00	0.00	2.85	0.01	0.00
14.32	1.17	0.00	2.84	0.01	0.00	14.33	0.79	0.21	2.84	0.01	0.01
14.34	0.67	0.33	2.83	0.01	0.01	14.35	0.68	0.32	2.83	0.01	0.01
14.36	0.83	0.17	2.82	0.01	0.00	14.37	1.27	0.00	2.82	0.01	0.00
14.38	1.99	0.00	2.81	0.01	0.00	14.39	2.00	0.00	2.81	0.01	0.00
14.40	2.00	0.00	2.80	0.01	0.00	14.41	2.00	0.00	2.80	0.01	0.00
14.42	2.00	0.00	2.79	0.01	0.00	14.43	2.00	0.00	2.79	0.01	0.00
14.44	2.00	0.00	2.78	0.01	0.00	14.45	2.00	0.00	2.78	0.01	0.00
14.46	2.00	0.00	2.77	0.01	0.00	14.47	2.00	0.00	2.77	0.01	0.00
14.48	2.00	0.00	2.76	0.01	0.00	14.49	2.00	0.00	2.76	0.01	0.00
14.50	2.00	0.00	2.75	0.01	0.00	14.51	2.00	0.00	2.75	0.01	0.00
14.52	2.00	0.00	2.74	0.01	0.00	14.53	2.00	0.00	2.74	0.01	0.00
14.54	2.00	0.00	2.73	0.01	0.00	14.55	2.00	0.00	2.73	0.01	0.00
14.56	2.00	0.00	2.72	0.01	0.00	14.57	2.00	0.00	2.72	0.01	0.00
14.58	2.00	0.00	2.71	0.01	0.00	14.59	2.00	0.00	2.71	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
14.60	2.00	0.00	2.70	0.01	0.00	14.61	2.00	0.00	2.70	0.01	0.00
14.62	2.00	0.00	2.69	0.01	0.00	14.63	2.00	0.00	2.69	0.01	0.00
14.64	2.00	0.00	2.68	0.01	0.00	14.65	2.00	0.00	2.67	0.01	0.00
14.66	2.00	0.00	2.67	0.01	0.00	14.67	2.00	0.00	2.67	0.01	0.00
14.68	2.00	0.00	2.66	0.01	0.00	14.69	2.00	0.00	2.65	0.01	0.00
14.70	2.00	0.00	2.65	0.01	0.00	14.71	2.00	0.00	2.65	0.01	0.00
14.72	2.00	0.00	2.64	0.01	0.00	14.73	2.00	0.00	2.63	0.01	0.00
14.74	2.00	0.00	2.63	0.01	0.00	14.75	2.00	0.00	2.63	0.01	0.00
14.76	2.00	0.00	2.62	0.01	0.00	14.77	2.00	0.00	2.62	0.01	0.00
14.78	2.00	0.00	2.61	0.01	0.00	14.79	2.00	0.00	2.61	0.01	0.00
14.80	2.00	0.00	2.60	0.01	0.00	14.81	2.00	0.00	2.60	0.01	0.00
14.82	2.00	0.00	2.59	0.01	0.00	14.83	2.00	0.00	2.59	0.01	0.00
14.84	2.00	0.00	2.58	0.01	0.00	14.85	2.00	0.00	2.58	0.01	0.00
14.86	2.00	0.00	2.57	0.01	0.00	14.87	2.00	0.00	2.57	0.01	0.00
14.88	2.00	0.00	2.56	0.01	0.00	14.89	2.00	0.00	2.56	0.01	0.00
14.90	2.00	0.00	2.55	0.01	0.00	14.91	2.00	0.00	2.55	0.01	0.00
14.92	2.00	0.00	2.54	0.01	0.00	14.93	2.00	0.00	2.54	0.01	0.00
14.94	2.00	0.00	2.53	0.01	0.00	14.95	2.00	0.00	2.53	0.01	0.00
14.96	2.00	0.00	2.52	0.01	0.00	14.97	2.00	0.00	2.52	0.01	0.00
14.98	2.00	0.00	2.51	0.01	0.00	14.99	2.00	0.00	2.51	0.01	0.00
15.00	2.00	0.00	2.50	0.01	0.00	15.01	2.00	0.00	2.50	0.01	0.00
15.02	2.00	0.00	2.49	0.01	0.00	15.03	2.00	0.00	2.49	0.01	0.00
15.04	2.00	0.00	2.48	0.01	0.00	15.05	2.00	0.00	2.48	0.01	0.00
15.06	2.00	0.00	2.47	0.01	0.00	15.07	2.00	0.00	2.47	0.01	0.00
15.08	2.00	0.00	2.46	0.01	0.00	15.09	2.00	0.00	2.46	0.01	0.00
15.10	2.00	0.00	2.45	0.01	0.00	15.11	2.00	0.00	2.45	0.01	0.00
15.12	2.00	0.00	2.44	0.01	0.00	15.13	2.00	0.00	2.44	0.01	0.00
15.14	2.00	0.00	2.43	0.01	0.00	15.15	2.00	0.00	2.42	0.01	0.00
15.16	2.00	0.00	2.42	0.01	0.00	15.17	2.00	0.00	2.42	0.01	0.00
15.18	2.00	0.00	2.41	0.01	0.00	15.19	2.00	0.00	2.40	0.01	0.00
15.20	2.00	0.00	2.40	0.01	0.00	15.21	2.00	0.00	2.40	0.01	0.00
15.22	2.00	0.00	2.39	0.01	0.00	15.23	2.00	0.00	2.38	0.01	0.00
15.24	2.00	0.00	2.38	0.01	0.00	15.25	2.00	0.00	2.38	0.01	0.00
15.26	2.00	0.00	2.37	0.01	0.00	15.27	2.00	0.00	2.37	0.01	0.00
15.28	2.00	0.00	2.36	0.01	0.00	15.29	2.00	0.00	2.36	0.01	0.00
15.30	2.00	0.00	2.35	0.01	0.00	15.31	2.00	0.00	2.35	0.01	0.00
15.32	2.00	0.00	2.34	0.01	0.00	15.33	2.00	0.00	2.34	0.01	0.00
15.34	2.00	0.00	2.33	0.01	0.00	15.35	2.00	0.00	2.33	0.01	0.00
15.36	2.00	0.00	2.32	0.01	0.00	15.37	2.00	0.00	2.32	0.01	0.00
15.38	2.00	0.00	2.31	0.01	0.00	15.39	2.00	0.00	2.31	0.01	0.00
15.40	2.00	0.00	2.30	0.01	0.00	15.41	2.00	0.00	2.30	0.01	0.00
15.42	2.00	0.00	2.29	0.01	0.00	15.43	2.00	0.00	2.29	0.01	0.00
15.44	1.77	0.00	2.28	0.01	0.00	15.45	1.83	0.00	2.28	0.01	0.00
15.46	2.00	0.00	2.27	0.01	0.00	15.47	2.00	0.00	2.27	0.01	0.00
15.48	2.00	0.00	2.26	0.01	0.00	15.49	2.00	0.00	2.26	0.01	0.00
15.50	2.00	0.00	2.25	0.01	0.00	15.51	2.00	0.00	2.25	0.01	0.00
15.52	1.68	0.00	2.24	0.01	0.00	15.53	1.37	0.00	2.24	0.01	0.00
15.54	1.05	0.00	2.23	0.01	0.00	15.55	1.01	0.00	2.23	0.01	0.00

**:: Liquefaction Potential Index calculation data :: (continued)**

Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
15.56	0.96	0.04	2.22	0.01	0.00	15.57	0.94	0.06	2.22	0.01	0.00
15.58	0.92	0.08	2.21	0.01	0.00	15.59	0.92	0.08	2.21	0.01	0.00
15.60	0.90	0.10	2.20	0.01	0.00	15.61	0.89	0.11	2.20	0.01	0.00
15.62	0.88	0.12	2.19	0.01	0.00	15.63	0.87	0.13	2.19	0.01	0.00
15.64	0.86	0.14	2.18	0.01	0.00	15.65	0.86	0.14	2.17	0.01	0.00
15.66	0.86	0.14	2.17	0.01	0.00	15.67	0.87	0.13	2.17	0.01	0.00
15.68	0.88	0.12	2.16	0.01	0.00	15.69	0.90	0.10	2.15	0.01	0.00
15.70	0.91	0.09	2.15	0.01	0.00	15.71	0.92	0.08	2.15	0.01	0.00
15.72	0.94	0.06	2.14	0.01	0.00	15.73	0.99	0.01	2.13	0.01	0.00
15.74	1.03	0.00	2.13	0.01	0.00	15.75	1.08	0.00	2.13	0.01	0.00
15.76	1.21	0.00	2.12	0.01	0.00	15.77	1.28	0.00	2.12	0.01	0.00
15.78	1.30	0.00	2.11	0.01	0.00	15.79	1.28	0.00	2.11	0.01	0.00
15.80	1.32	0.00	2.10	0.01	0.00	15.81	1.56	0.00	2.10	0.01	0.00
15.82	2.00	0.00	2.09	0.01	0.00	15.83	2.00	0.00	2.09	0.01	0.00
15.84	2.00	0.00	2.08	0.01	0.00	15.85	2.00	0.00	2.08	0.01	0.00
15.86	2.00	0.00	2.07	0.01	0.00	15.87	2.00	0.00	2.07	0.01	0.00
15.88	2.00	0.00	2.06	0.01	0.00	15.89	2.00	0.00	2.06	0.01	0.00
15.90	2.00	0.00	2.05	0.01	0.00	15.91	2.00	0.00	2.05	0.01	0.00
15.92	2.00	0.00	2.04	0.01	0.00	15.93	2.00	0.00	2.04	0.01	0.00
15.94	2.00	0.00	2.03	0.01	0.00	15.95	2.00	0.00	2.03	0.01	0.00
15.96	2.00	0.00	2.02	0.01	0.00	15.97	2.00	0.00	2.02	0.01	0.00
15.98	2.00	0.00	2.01	0.01	0.00	15.99	2.00	0.00	2.01	0.01	0.00
16.00	2.00	0.00	2.00	0.01	0.00	16.01	2.00	0.00	2.00	0.01	0.00
16.02	2.00	0.00	1.99	0.01	0.00	16.03	2.00	0.00	1.99	0.01	0.00
16.04	1.72	0.00	1.98	0.01	0.00	16.05	0.93	0.07	1.98	0.01	0.00
16.06	0.83	0.17	1.97	0.01	0.00	16.07	0.86	0.14	1.97	0.01	0.00
16.08	0.89	0.11	1.96	0.01	0.00	16.09	0.92	0.08	1.96	0.01	0.00
16.10	0.96	0.04	1.95	0.01	0.00	16.11	1.21	0.00	1.95	0.01	0.00
16.12	1.71	0.00	1.94	0.01	0.00	16.13	2.00	0.00	1.94	0.01	0.00
16.14	2.00	0.00	1.93	0.01	0.00	16.15	2.00	0.00	1.93	0.01	0.00
16.16	2.00	0.00	1.92	0.01	0.00	16.17	2.00	0.00	1.92	0.01	0.00
16.18	2.00	0.00	1.91	0.01	0.00	16.19	2.00	0.00	1.91	0.01	0.00
16.20	2.00	0.00	1.90	0.01	0.00	16.21	1.68	0.00	1.90	0.01	0.00
16.22	1.36	0.00	1.89	0.01	0.00	16.23	1.32	0.00	1.89	0.01	0.00
16.24	1.31	0.00	1.88	0.01	0.00	16.25	1.30	0.00	1.88	0.01	0.00
16.26	1.29	0.00	1.87	0.01	0.00	16.27	1.28	0.00	1.87	0.01	0.00
16.28	1.26	0.00	1.86	0.01	0.00	16.29	1.24	0.00	1.86	0.01	0.00
16.30	1.21	0.00	1.85	0.01	0.00	16.31	1.17	0.00	1.85	0.01	0.00
16.32	1.13	0.00	1.84	0.01	0.00	16.33	1.10	0.00	1.84	0.01	0.00
16.34	1.08	0.00	1.83	0.01	0.00	16.35	1.08	0.00	1.83	0.01	0.00
16.36	1.09	0.00	1.82	0.01	0.00	16.37	1.11	0.00	1.82	0.01	0.00
16.38	1.14	0.00	1.81	0.01	0.00	16.39	1.18	0.00	1.81	0.01	0.00
16.40	1.22	0.00	1.80	0.01	0.00	16.41	1.26	0.00	1.80	0.01	0.00
16.42	1.30	0.00	1.79	0.01	0.00	16.43	1.37	0.00	1.79	0.01	0.00
16.44	1.45	0.00	1.78	0.01	0.00	16.45	1.55	0.00	1.78	0.01	0.00
16.46	1.62	0.00	1.77	0.01	0.00	16.47	1.69	0.00	1.77	0.01	0.00
16.48	1.72	0.00	1.76	0.01	0.00	16.49	1.74	0.00	1.76	0.01	0.00
16.50	1.72	0.00	1.75	0.01	0.00	16.51	1.68	0.00	1.75	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
16.52	1.61	0.00	1.74	0.01	0.00	16.53	1.55	0.00	1.74	0.01	0.00
16.54	1.48	0.00	1.73	0.01	0.00	16.55	1.40	0.00	1.73	0.01	0.00
16.56	1.31	0.00	1.72	0.01	0.00	16.57	1.18	0.00	1.72	0.01	0.00
16.58	1.08	0.00	1.71	0.01	0.00	16.59	1.00	0.00	1.71	0.01	0.00
16.60	0.98	0.02	1.70	0.01	0.00	16.61	0.95	0.05	1.70	0.01	0.00
16.62	0.92	0.08	1.69	0.01	0.00	16.63	1.54	0.00	1.69	0.01	0.00
16.64	2.00	0.00	1.68	0.01	0.00	16.65	2.00	0.00	1.68	0.01	0.00
16.66	2.00	0.00	1.67	0.01	0.00	16.67	2.00	0.00	1.67	0.01	0.00
16.68	2.00	0.00	1.66	0.01	0.00	16.69	2.00	0.00	1.66	0.01	0.00
16.70	2.00	0.00	1.65	0.01	0.00	16.71	2.00	0.00	1.65	0.01	0.00
16.72	2.00	0.00	1.64	0.01	0.00	16.73	2.00	0.00	1.64	0.01	0.00
16.74	2.00	0.00	1.63	0.01	0.00	16.75	2.00	0.00	1.63	0.01	0.00
16.76	2.00	0.00	1.62	0.01	0.00	16.77	2.00	0.00	1.62	0.01	0.00
16.78	2.00	0.00	1.61	0.01	0.00	16.79	2.00	0.00	1.61	0.01	0.00
16.80	2.00	0.00	1.60	0.01	0.00	16.81	2.00	0.00	1.60	0.01	0.00
16.82	2.00	0.00	1.59	0.01	0.00	16.83	2.00	0.00	1.59	0.01	0.00
16.84	2.00	0.00	1.58	0.01	0.00	16.85	2.00	0.00	1.58	0.01	0.00
16.86	2.00	0.00	1.57	0.01	0.00	16.87	2.00	0.00	1.57	0.01	0.00
16.88	2.00	0.00	1.56	0.01	0.00	16.89	2.00	0.00	1.56	0.01	0.00
16.90	2.00	0.00	1.55	0.01	0.00	16.91	2.00	0.00	1.55	0.01	0.00
16.92	2.00	0.00	1.54	0.01	0.00	16.93	2.00	0.00	1.54	0.01	0.00
16.94	2.00	0.00	1.53	0.01	0.00	16.95	2.00	0.00	1.53	0.01	0.00
16.96	2.00	0.00	1.52	0.01	0.00	16.97	2.00	0.00	1.52	0.01	0.00
16.98	2.00	0.00	1.51	0.01	0.00	16.99	2.00	0.00	1.51	0.01	0.00
17.00	2.00	0.00	1.50	0.01	0.00	17.01	2.00	0.00	1.50	0.01	0.00
17.02	2.00	0.00	1.49	0.01	0.00	17.03	2.00	0.00	1.49	0.01	0.00
17.04	2.00	0.00	1.48	0.01	0.00	17.05	2.00	0.00	1.48	0.01	0.00
17.06	2.00	0.00	1.47	0.01	0.00	17.07	2.00	0.00	1.47	0.01	0.00
17.08	2.00	0.00	1.46	0.01	0.00	17.09	2.00	0.00	1.46	0.01	0.00
17.10	2.00	0.00	1.45	0.01	0.00	17.11	2.00	0.00	1.45	0.01	0.00
17.12	2.00	0.00	1.44	0.01	0.00	17.13	2.00	0.00	1.44	0.01	0.00
17.14	2.00	0.00	1.43	0.01	0.00	17.15	2.00	0.00	1.43	0.01	0.00
17.16	2.00	0.00	1.42	0.01	0.00	17.17	2.00	0.00	1.42	0.01	0.00
17.18	2.00	0.00	1.41	0.01	0.00	17.19	2.00	0.00	1.41	0.01	0.00
17.20	2.00	0.00	1.40	0.01	0.00	17.21	2.00	0.00	1.40	0.01	0.00
17.22	2.00	0.00	1.39	0.01	0.00	17.23	2.00	0.00	1.39	0.01	0.00
17.24	2.00	0.00	1.38	0.01	0.00	17.25	2.00	0.00	1.38	0.01	0.00
17.26	2.00	0.00	1.37	0.01	0.00	17.27	2.00	0.00	1.37	0.01	0.00
17.28	2.00	0.00	1.36	0.01	0.00	17.29	2.00	0.00	1.36	0.01	0.00
17.30	2.00	0.00	1.35	0.01	0.00	17.31	2.00	0.00	1.35	0.01	0.00
17.32	2.00	0.00	1.34	0.01	0.00	17.33	2.00	0.00	1.34	0.01	0.00
17.34	2.00	0.00	1.33	0.01	0.00	17.35	2.00	0.00	1.33	0.01	0.00
17.36	2.00	0.00	1.32	0.01	0.00	17.37	2.00	0.00	1.32	0.01	0.00
17.38	2.00	0.00	1.31	0.01	0.00	17.39	2.00	0.00	1.31	0.01	0.00
17.40	2.00	0.00	1.30	0.01	0.00	17.41	2.00	0.00	1.30	0.01	0.00
17.42	2.00	0.00	1.29	0.01	0.00	17.43	2.00	0.00	1.29	0.01	0.00
17.44	2.00	0.00	1.28	0.01	0.00	17.45	2.00	0.00	1.27	0.01	0.00
17.46	2.00	0.00	1.27	0.01	0.00	17.47	2.00	0.00	1.26	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
17.48	2.00	0.00	1.26	0.01	0.00	17.49	2.00	0.00	1.25	0.01	0.00
17.50	2.00	0.00	1.25	0.01	0.00	17.51	2.00	0.00	1.25	0.01	0.00
17.52	2.00	0.00	1.24	0.01	0.00	17.53	2.00	0.00	1.24	0.01	0.00
17.54	2.00	0.00	1.23	0.01	0.00	17.55	2.00	0.00	1.23	0.01	0.00
17.56	2.00	0.00	1.22	0.01	0.00	17.57	2.00	0.00	1.22	0.01	0.00
17.58	2.00	0.00	1.21	0.01	0.00	17.59	2.00	0.00	1.21	0.01	0.00
17.60	2.00	0.00	1.20	0.01	0.00	17.61	2.00	0.00	1.20	0.01	0.00
17.62	2.00	0.00	1.19	0.01	0.00	17.63	2.00	0.00	1.19	0.01	0.00
17.64	2.00	0.00	1.18	0.01	0.00	17.65	2.00	0.00	1.18	0.01	0.00
17.66	2.00	0.00	1.17	0.01	0.00	17.67	2.00	0.00	1.17	0.01	0.00
17.68	2.00	0.00	1.16	0.01	0.00	17.69	2.00	0.00	1.16	0.01	0.00
17.70	2.00	0.00	1.15	0.01	0.00	17.71	2.00	0.00	1.15	0.01	0.00
17.72	2.00	0.00	1.14	0.01	0.00	17.73	2.00	0.00	1.14	0.01	0.00
17.74	2.00	0.00	1.13	0.01	0.00	17.75	2.00	0.00	1.13	0.01	0.00
17.76	2.00	0.00	1.12	0.01	0.00	17.77	2.00	0.00	1.12	0.01	0.00
17.78	2.00	0.00	1.11	0.01	0.00	17.79	2.00	0.00	1.11	0.01	0.00
17.80	2.00	0.00	1.10	0.01	0.00	17.81	2.00	0.00	1.10	0.01	0.00
17.82	2.00	0.00	1.09	0.01	0.00	17.83	2.00	0.00	1.09	0.01	0.00
17.84	2.00	0.00	1.08	0.01	0.00	17.85	2.00	0.00	1.08	0.01	0.00
17.86	2.00	0.00	1.07	0.01	0.00	17.87	2.00	0.00	1.07	0.01	0.00
17.88	2.00	0.00	1.06	0.01	0.00	17.89	2.00	0.00	1.06	0.01	0.00
17.90	2.00	0.00	1.05	0.01	0.00	17.91	2.00	0.00	1.05	0.01	0.00
17.92	2.00	0.00	1.04	0.01	0.00	17.93	2.00	0.00	1.04	0.01	0.00
17.94	2.00	0.00	1.03	0.01	0.00	17.95	2.00	0.00	1.02	0.01	0.00
17.96	2.00	0.00	1.02	0.01	0.00	17.97	2.00	0.00	1.01	0.01	0.00
17.98	2.00	0.00	1.01	0.01	0.00	17.99	2.00	0.00	1.00	0.01	0.00
18.00	2.00	0.00	1.00	0.01	0.00	18.01	2.00	0.00	0.99	0.01	0.00
18.02	2.00	0.00	0.99	0.01	0.00	18.03	2.00	0.00	0.98	0.01	0.00
18.04	2.00	0.00	0.98	0.01	0.00	18.05	2.00	0.00	0.98	0.01	0.00
18.06	2.00	0.00	0.97	0.01	0.00	18.07	2.00	0.00	0.97	0.01	0.00
18.08	2.00	0.00	0.96	0.01	0.00	18.09	2.00	0.00	0.96	0.01	0.00
18.10	2.00	0.00	0.95	0.01	0.00	18.11	2.00	0.00	0.95	0.01	0.00
18.12	2.00	0.00	0.94	0.01	0.00	18.13	2.00	0.00	0.94	0.01	0.00
18.14	2.00	0.00	0.93	0.01	0.00	18.15	2.00	0.00	0.93	0.01	0.00
18.16	2.00	0.00	0.92	0.01	0.00	18.17	2.00	0.00	0.91	0.01	0.00
18.18	2.00	0.00	0.91	0.01	0.00	18.19	2.00	0.00	0.90	0.01	0.00
18.20	2.00	0.00	0.90	0.01	0.00	18.21	2.00	0.00	0.90	0.01	0.00
18.22	2.00	0.00	0.89	0.01	0.00	18.23	2.00	0.00	0.89	0.01	0.00
18.24	2.00	0.00	0.88	0.01	0.00	18.25	2.00	0.00	0.88	0.01	0.00
18.26	2.00	0.00	0.87	0.01	0.00	18.27	2.00	0.00	0.87	0.01	0.00
18.28	2.00	0.00	0.86	0.01	0.00	18.29	2.00	0.00	0.86	0.01	0.00
18.30	2.00	0.00	0.85	0.01	0.00	18.31	2.00	0.00	0.85	0.01	0.00
18.32	2.00	0.00	0.84	0.01	0.00	18.33	2.00	0.00	0.84	0.01	0.00
18.34	2.00	0.00	0.83	0.01	0.00	18.35	2.00	0.00	0.82	0.01	0.00
18.36	2.00	0.00	0.82	0.01	0.00	18.37	2.00	0.00	0.81	0.01	0.00
18.38	2.00	0.00	0.81	0.01	0.00	18.39	2.00	0.00	0.81	0.01	0.00
18.40	2.00	0.00	0.80	0.01	0.00	18.41	2.00	0.00	0.80	0.01	0.00
18.42	2.00	0.00	0.79	0.01	0.00	18.43	2.00	0.00	0.79	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
18.44	2.00	0.00	0.78	0.01	0.00	18.45	2.00	0.00	0.78	0.01	0.00
18.46	2.00	0.00	0.77	0.01	0.00	18.47	2.00	0.00	0.77	0.01	0.00
18.48	2.00	0.00	0.76	0.01	0.00	18.49	2.00	0.00	0.76	0.01	0.00
18.50	2.00	0.00	0.75	0.01	0.00	18.51	2.00	0.00	0.74	0.01	0.00
18.52	2.00	0.00	0.74	0.01	0.00	18.53	2.00	0.00	0.73	0.01	0.00
18.54	2.00	0.00	0.73	0.01	0.00	18.55	2.00	0.00	0.73	0.01	0.00
18.56	2.00	0.00	0.72	0.01	0.00	18.57	2.00	0.00	0.72	0.01	0.00
18.58	2.00	0.00	0.71	0.01	0.00	18.59	2.00	0.00	0.71	0.01	0.00
18.60	2.00	0.00	0.70	0.01	0.00	18.61	2.00	0.00	0.70	0.01	0.00
18.62	2.00	0.00	0.69	0.01	0.00	18.63	2.00	0.00	0.69	0.01	0.00
18.64	2.00	0.00	0.68	0.01	0.00	18.65	2.00	0.00	0.68	0.01	0.00
18.66	2.00	0.00	0.67	0.01	0.00	18.67	2.00	0.00	0.66	0.01	0.00
18.68	2.00	0.00	0.66	0.01	0.00	18.69	2.00	0.00	0.65	0.01	0.00
18.70	2.00	0.00	0.65	0.01	0.00	18.71	2.00	0.00	0.65	0.01	0.00
18.72	2.00	0.00	0.64	0.01	0.00	18.73	2.00	0.00	0.64	0.01	0.00
18.74	2.00	0.00	0.63	0.01	0.00	18.75	2.00	0.00	0.63	0.01	0.00
18.76	2.00	0.00	0.62	0.01	0.00	18.77	2.00	0.00	0.62	0.01	0.00
18.78	2.00	0.00	0.61	0.01	0.00	18.79	2.00	0.00	0.61	0.01	0.00
18.80	2.00	0.00	0.60	0.01	0.00	18.81	2.00	0.00	0.60	0.01	0.00
18.82	2.00	0.00	0.59	0.01	0.00	18.83	2.00	0.00	0.59	0.01	0.00
18.84	2.00	0.00	0.58	0.01	0.00	18.85	2.00	0.00	0.57	0.01	0.00
18.86	2.00	0.00	0.57	0.01	0.00	18.87	2.00	0.00	0.56	0.01	0.00
18.88	2.00	0.00	0.56	0.01	0.00	18.89	2.00	0.00	0.56	0.01	0.00
18.90	2.00	0.00	0.55	0.01	0.00	18.91	2.00	0.00	0.55	0.01	0.00
18.92	2.00	0.00	0.54	0.01	0.00	18.93	2.00	0.00	0.54	0.01	0.00
18.94	2.00	0.00	0.53	0.01	0.00	18.95	2.00	0.00	0.53	0.01	0.00
18.96	2.00	0.00	0.52	0.01	0.00	18.97	2.00	0.00	0.52	0.01	0.00
18.98	2.00	0.00	0.51	0.01	0.00	18.99	2.00	0.00	0.51	0.01	0.00
19.00	2.00	0.00	0.50	0.01	0.00	19.01	2.00	0.00	0.49	0.01	0.00
19.02	2.00	0.00	0.49	0.01	0.00	19.03	2.00	0.00	0.48	0.01	0.00
19.04	2.00	0.00	0.48	0.01	0.00	19.05	2.00	0.00	0.48	0.01	0.00
19.06	2.00	0.00	0.47	0.01	0.00	19.07	2.00	0.00	0.47	0.01	0.00
19.08	2.00	0.00	0.46	0.01	0.00	19.09	2.00	0.00	0.46	0.01	0.00
19.10	2.00	0.00	0.45	0.01	0.00	19.11	2.00	0.00	0.45	0.01	0.00
19.12	2.00	0.00	0.44	0.01	0.00	19.13	2.00	0.00	0.44	0.01	0.00
19.14	2.00	0.00	0.43	0.01	0.00	19.15	2.00	0.00	0.43	0.01	0.00
19.16	2.00	0.00	0.42	0.01	0.00	19.17	2.00	0.00	0.41	0.01	0.00
19.18	2.00	0.00	0.41	0.01	0.00	19.19	2.00	0.00	0.40	0.01	0.00
19.20	2.00	0.00	0.40	0.01	0.00	19.21	2.00	0.00	0.40	0.01	0.00
19.22	2.00	0.00	0.39	0.01	0.00	19.23	2.00	0.00	0.39	0.01	0.00
19.24	2.00	0.00	0.38	0.01	0.00	19.25	2.00	0.00	0.38	0.01	0.00
19.26	2.00	0.00	0.37	0.01	0.00	19.27	2.00	0.00	0.37	0.01	0.00
19.28	2.00	0.00	0.36	0.01	0.00	19.29	2.00	0.00	0.36	0.01	0.00
19.30	2.00	0.00	0.35	0.01	0.00	19.31	2.00	0.00	0.35	0.01	0.00
19.32	2.00	0.00	0.34	0.01	0.00	19.33	2.00	0.00	0.34	0.01	0.00
19.34	2.00	0.00	0.33	0.01	0.00	19.35	2.00	0.00	0.32	0.01	0.00
19.36	2.00	0.00	0.32	0.01	0.00	19.37	2.00	0.00	0.31	0.01	0.00
19.38	2.00	0.00	0.31	0.01	0.00	19.39	2.00	0.00	0.31	0.01	0.00

:: Liquefaction Potential Index calculation data :: (continued)											
Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI	Depth (m)	FS	F <sub>L</sub>	w <sub>z</sub>	d <sub>z</sub>	LPI
19.40	2.00	0.00	0.30	0.01	0.00	19.41	2.00	0.00	0.30	0.01	0.00
19.42	2.00	0.00	0.29	0.01	0.00	19.43	2.00	0.00	0.28	0.01	0.00
19.44	2.00	0.00	0.28	0.01	0.00	19.45	2.00	0.00	0.28	0.01	0.00
19.46	2.00	0.00	0.27	0.01	0.00	19.47	2.00	0.00	0.27	0.01	0.00
19.48	2.00	0.00	0.26	0.01	0.00	19.49	2.00	0.00	0.26	0.01	0.00
19.50	2.00	0.00	0.25	0.01	0.00	19.51	2.00	0.00	0.24	0.01	0.00
19.52	2.00	0.00	0.24	0.01	0.00	19.53	2.00	0.00	0.23	0.01	0.00
19.54	2.00	0.00	0.23	0.01	0.00	19.55	2.00	0.00	0.23	0.01	0.00
19.56	2.00	0.00	0.22	0.01	0.00	19.57	2.00	0.00	0.22	0.01	0.00
19.58	2.00	0.00	0.21	0.01	0.00	19.59	2.00	0.00	0.21	0.01	0.00
19.60	2.00	0.00	0.20	0.01	0.00	19.61	2.00	0.00	0.20	0.01	0.00
19.62	2.00	0.00	0.19	0.01	0.00	19.63	2.00	0.00	0.19	0.01	0.00
19.64	2.00	0.00	0.18	0.01	0.00	19.65	2.00	0.00	0.18	0.01	0.00
19.66	2.00	0.00	0.17	0.01	0.00	19.67	2.00	0.00	0.16	0.01	0.00
19.68	2.00	0.00	0.16	0.01	0.00	19.69	2.00	0.00	0.15	0.01	0.00
19.70	2.00	0.00	0.15	0.01	0.00	19.71	2.00	0.00	0.15	0.01	0.00
19.72	2.00	0.00	0.14	0.01	0.00	19.73	2.00	0.00	0.14	0.01	0.00
19.74	2.00	0.00	0.13	0.01	0.00	19.75	2.00	0.00	0.13	0.01	0.00
19.76	2.00	0.00	0.12	0.01	0.00	19.77	2.00	0.00	0.12	0.01	0.00
19.78	2.00	0.00	0.11	0.01	0.00	19.79	2.00	0.00	0.11	0.01	0.00
19.80	2.00	0.00	0.10	0.01	0.00	19.81	2.00	0.00	0.10	0.01	0.00
19.82	2.00	0.00	0.09	0.01	0.00	19.83	2.00	0.00	0.09	0.01	0.00
19.84	2.00	0.00	0.08	0.01	0.00	19.85	2.00	0.00	0.07	0.01	0.00
19.86	2.00	0.00	0.07	0.01	0.00	19.87	2.00	0.00	0.06	0.01	0.00
19.88	2.00	0.00	0.06	0.01	0.00	19.89	2.00	0.00	0.05	0.01	0.00
19.90	2.00	0.00	0.05	0.01	0.00	19.91	2.00	0.00	0.04	0.01	0.00
19.92	2.00	0.00	0.04	0.01	0.00	19.93	2.00	0.00	0.04	0.01	0.00
19.94	2.00	0.00	0.03	0.01	0.00	19.95	2.00	0.00	0.03	0.01	0.00
19.96	2.00	0.00	0.02	0.01	0.00	19.97	2.00	0.00	0.02	0.01	0.00
19.98	2.00	0.00	0.01	0.01	0.00	19.99	2.00	0.00	0.01	0.01	0.00
20.00	2.00	0.00	0.00	0.01	0.00						

**Overall liquefaction potential: 0.10**

LPI = 0.00 - Liquefaction risk very low  
 LPI between 0.00 and 5.00 - Liquefaction risk low  
 LPI between 5.00 and 15.00 - Liquefaction risk high  
 LPI > 15.00 - Liquefaction risk very high

#### Abbreviations

FS: Calculated factor of safety for test point  
 F<sub>L</sub>: 1 - FS  
 w<sub>z</sub>: Function value of the extend of soil liquefaction according to depth  
 d<sub>z</sub>: Layer thickness (m)  
 LPI: Liquefaction potential index value for test point

### Metodo di Idriss & Boulanger (2014)

Nel metodo proposto da **Idriss e Boulanger** l'indice di comportamento  $I_C$  per il tipo di suolo è ricavato con le formule riportate di seguito:

$$I_c = \left[ (\log_{10} Q - 3,47)^2 + (\log_{10} R_f + 1,22)^2 \right]^{0,5} \quad (6.0a)$$

$$Q = \frac{q_c - \sigma_{vo}}{Pa} \left( \frac{Pa}{\sigma'_{vo}} \right)^n \quad (6.0b)$$

$$R_f = \frac{f_s}{q_c - \sigma_{vo}} 100 \quad (6.0c)$$

dove

$q_c$  è la resistenza alla punta misurata

$Pa$  è la tensione di riferimento (1 atmosfera) nelle stesse unità di  $\sigma'_{vo}$

$f_s$  è l'attrito del manicotto

$n$  è un'esponente che dipende dal tipo di suolo, variabile tra 0,5 e 1.

Calcolato  $I_C$ , si procede con la correzione della resistenza alla punta misurata  $q_c$  mediante la seguente espressione:

$$q_{c1N} = C_Q \cdot \left( \frac{q_c}{Pa} \right) \quad (6.1)$$

$$C_Q = \left( \frac{Pa}{\sigma'_{vo}} \right)^n \leq 1,7 \quad (6.2)$$

dove  $n$  si determina per via iterativa dalla seguente relazione:

$$n = 1,338 - 0,249 \cdot q_{c1N}^{0,264} \quad (6.3)$$

La correzione della resistenza alla punta dovuta al contenuto di materiale fine viene valutata mediante la seguente procedura:

$$(q_{c1N})_{cs} = q_{c1N} + \Delta q_{c1N} \quad (6.4a)$$

$$\Delta q_{c1N} = \left( 11,9 + \frac{q_{c1N}}{14,6} \right) \cdot \exp \left[ 1,63 - \frac{9,7}{FC + 2} - \left( \frac{15,7}{FC + 2} \right)^2 \right] \quad (6.4b)$$

Dove la frazione di fine  $FC(\%)$  viene calcolata mediante l'espressione seguente:

$$FC(\%) = 2,8 \cdot (I_c)^{2,60} \quad (6.5)$$

La resistenza alla liquefazione per una magnitudo pari a 7,5 (**CRR**<sub>7,5</sub>) si calcola da:

$$CRR = \exp \left[ \frac{(q_{c1N})_{cs}}{113} + \left( \frac{(q_{c1N})_{cs}}{1000} \right)^2 - \left( \frac{(q_{c1N})_{cs}}{140} \right)^3 + \left( \frac{(q_{c1N})_{cs}}{137} \right)^4 - 2.80 \right] \quad (6.6)$$

Per  $z_w > z$ , con  $z_w$  profondità della falda, e per  $(q_{c1N})_{cs} \leq 160$  il terreno è non liquefacibile (NL).

Il rapporto di sforzo ciclico **CSR** (*Cyclic Stress Ratio*) si determina da:

$$CSR = 0,65 \cdot \left( \frac{a_{max}}{g} \right) \cdot \left( \frac{\sigma_{v0}}{\sigma'_{v0}} \right) \cdot r_d \quad (6.7)$$

Dove per il coefficiente di riduzione delle tensioni  $r_d$  si utilizza la formula, con  $M$  si indica la magnitudo:

$$r_d = \exp[\alpha(z) + \beta(z) \cdot M] \quad (6.8a)$$

$$\alpha = -1,1012 - 1,126 \cdot \operatorname{sen} \left[ \frac{z}{11,73} + 5,133 \right] \quad (6.8b)$$

$$\beta = 0,106 + 0,118 \cdot \operatorname{sen} \left[ \frac{z}{11,28} + 5,142 \right] \quad (6.8c)$$

Il fattore di sicurezza alla liquefazione è definito nel modo seguente:

$$FS = \frac{CRR_{7,5}}{CSR} \cdot MSF \cdot K_\sigma \quad (6.9)$$

Per determinare il fattore di scala della magnitudo **MSF**, la formula di **Idriss & Boulanger** utilizza l'espressione:

$$MSF = 1 + (MSF_{max} - 1) \cdot 8.64 \cdot \exp \left( -\frac{M}{4} \right) - 1.325 \leq 1,8 \quad (6.10)$$

$$MSF_{max} = 1.09 + \left( \frac{qc1ncs}{180} \right)^3 \leq 2.2$$

Il fattore di correzione della pressione di confinamento  $K_\sigma$  è dato da:

$$K_\sigma = 1 - C_\sigma \cdot \ln \left( \frac{\sigma'_{v0}}{p_a} \right) \leq 1 \quad (6.11a)$$

$$C_\sigma = \frac{1}{37,3 - 8,27 \cdot (q_{c1N})^{0,264}} \leq 0,3 \quad (6.11b)$$

## DATI GENERALI

## PROGETTO E LOCALIZZAZIONE

Titolo lavoro: PUA "Via Romana" - CPT1

Cliente: CBL srl

Indirizzo, Coordinate: Via Romana - Medolla (MO)

Data 17/07/2020

Normativa: Norme Tecniche Costruzioni, Circolare 2 febbraio 2009, n.617

Fattore sicurezza normativa 1

### FALDA

Profondità falda idrica 1.5 m

### CARICHI SUL PIANO CAMPAGNA

Base 1 m

Lunghezza 10 m

Carico in superficie 100 kPa

Metodo calcolo stato tensionale Bussinesq

Coefficiente di Poisson 0.25

### DATI SIMICI

Accelerazione Bedrock 0.15

Tipo Suolo: C-Sabbie, ghiaie mediamente addensate, argille di media consistenza Vs30=180-360

Morfologia: T1-Superficie pianeggiante, pendii e rilievi isolati con inclinazione media  $i \leq 15^\circ$

Coefficiente amplificazione stratigrafica (SS) 1.58

Coefficiente amplificazione topografica (ST) 1

Magnitudo momento sismico (Mw) 6.14

Peak ground acceleration (PGA) 0.237

### PARAMETRI GEOTECNICI

Strato Nr	Descrizi one	Quota iniziale (m)	Quota finale (m)	Peso unià volume (KN/mc )	Peso unità volume saturo (KN/mc )	Numero colpi medio (Nspt)	D50 granuli (mm)	Resiste nza qc (KPa)	Resiste nza attrito laterale fs (KPa)	Velocit à onde di taglio Vs (m/s)
1		0	0.2	18	0	0	0	1000	53	0
2		0.2	0.4	18	0	0	0	1000	27	0
3		0.4	0.6	18	0	0	0	1200	46	0
4		0.6	0.8	18	0	0	0	1200	55	0
5		0.8	1	18	0	0	0	1100	46	0
6		1	1.2	18	0	0	0	2100	40	0
7		1.2	1.4	18	0	0	0	2100	68	0
8		1.4	1.6	18	0	0	0	2200	27	0
9		1.6	1.8	18	0	0	0	4300	86	0
10		1.8	2	18	0	0	0	1500	75	0
11		2	2.2	18	0	0	0	1500	60	0
12		2.2	2.4	18	0	0	0	1100	52	0
13		2.4	2.6	18	0	0	0	800	47	0

14	2.6	2.8	18	0	0	0	800	33	0
15	2.8	3	18	0	0	0	900	53	0
16	3	3.2	18	0	0	0	900	47	0
17	3.2	3.4	18	0	0	0	600	27	0
18	3.4	3.6	18	0	0	0	1300	41	0
19	3.6	3.8	18	0	0	0	1300	46	0
20	3.8	4	18	0	0	0	1000	27	0
21	4	4.2	18	0	0	0	1200	60	0
22	4.2	4.4	18	0	0	0	1000	33	0
23	4.4	4.6	18	0	0	0	1900	73	0
24	4.6	4.8	18	0	0	0	900	26	0
25	4.8	5	18	0	0	0	2200	88	0
26	5	5.2	18	0	0	0	1100	41	0
27	5.2	5.4	18	0	0	0	900	33	0
28	5.4	5.6	18	0	0	0	800	47	0
29	5.6	5.8	18	0	0	0	700	41	0
30	5.8	6	18	0	0	0	800	33	0
31	6	6.2	18	0	0	0	900	53	0
32	6.2	6.4	18	0	0	0	700	41	0
33	6.4	6.6	18	0	0	0	1500	88	0
34	6.6	6.8	18	0	0	0	1300	72	0
35	6.8	7	18	0	0	0	1100	79	0
36	7	7.2	18	0	0	0	1400	88	0
37	7.2	7.4	18	0	0	0	1200	60	0
38	7.4	7.6	18	0	0	0	1300	59	0
39	7.6	7.8	18	0	0	0	1300	59	0
40	7.8	8	18	0	0	0	1300	68	0
41	8	8.2	18	0	0	0	1500	79	0
42	8.2	8.4	18	0	0	0	1600	80	0
43	8.4	8.6	18	0	0	0	1600	80	0
44	8.6	8.8	18	0	0	0	1400	61	0
45	8.8	9	18	0	0	0	1700	106	0
46	9	9.2	18	0	0	0	1600	114	0
47	9.2	9.4	18	0	0	0	2100	124	0
48	9.4	9.6	18	0	0	0	2400	150	0
49	9.6	9.8	18	0	0	0	2400	150	0
50	9.8	10	18	0	0	0	2400	150	0
51	10	10.2	18	0	0	0	2300	144	0
52	10.2	10.4	18	0	0	0	1600	114	0
53	10.4	10.6	18	0	0	0	1800	129	0
54	10.6	10.8	18	0	0	0	1800	120	0
55	10.8	11	18	0	0	0	2000	118	0
56	11	11.2	18	0	0	0	1900	127	0
57	11.2	11.4	18	0	0	0	1900	112	0
58	11.4	11.6	18	0	0	0	1500	88	0
59	11.6	11.8	18	0	0	0	1100	69	0
60	11.8	12	18	0	0	0	1100	46	0
61	12	12.2	18	0	0	0	900	33	0
62	12.2	12.4	18	0	0	0	1100	41	0
63	12.4	12.6	18	0	0	0	1700	81	0
64	12.6	12.8	18	0	0	0	1900	100	0

65	12.8	13	18	0	0	0	1900	79	0
66	13	13.2	18	0	0	0	1400	74	0
67	13.2	13.4	18	0	0	0	1300	81	0
68	13.4	13.6	18	0	0	0	1600	133	0
69	13.6	13.8	18	0	0	0	2100	131	0
70	13.8	14	18	0	0	0	2800	133	0
71	14	14.2	18	0	0	0	2200	122	0
72	14.2	14.4	18	0	0	0	1800	95	0
73	14.4	14.6	18	0	0	0	1700	106	0
74	14.6	14.8	18	0	0	0	2200	88	0
75	14.8	15	18	0	0	0	1800	86	0
76	15	15.2	18	0	0	0	1800	100	0
77	15.2	15.4	18	0	0	0	1300	81	0
78	15.4	15.6	18	0	0	0	3600	189	0
79	15.6	15.8	18	0	0	0	2200	147	0
80	15.8	16	18	0	0	0	2000	133	0
81	16	16.2	18	0	0	0	2600	124	0
82	16.2	16.4	18	0	0	0	2800	147	0
83	16.4	16.6	18	0	0	0	2800	140	0
84	16.6	16.8	18	0	0	0	2900	107	0
85	16.8	17	18	0	0	0	1800	67	0
86	17	17.2	18	0	0	0	4800	133	0
87	17.2	17.4	18	0	0	0	2600	137	0
88	17.4	17.6	18	0	0	0	2800	140	0
89	17.6	17.8	18	0	0	0	3300	150	0
90	17.8	18	18	0	0	0	3100	172	0
91	18	18.2	18	0	0	0	2800	147	0
92	18.2	18.4	18	0	0	0	2000	133	0
93	18.4	18.6	18	0	0	0	2800	175	0
94	18.6	18.8	18	0	0	0	4000	211	0
95	18.8	19	18	0	0	0	3200	200	0
96	19	19.2	18	0	0	0	2800	187	0
97	19.2	19.4	18	0	0	0	2600	153	0
98	19.4	19.6	18	0	0	0	1800	129	0
99	19.6	19.8	18	0	0	0	1900	119	0
100	19.8	20	18	0	0	0	2200	138	0

Correzione per la magnitudo (MSF) 1.09

Nr.	Prof ondit à dal p.c. (m)	Press ione litost atica (KPa )	Press ione verti cale (KPa )	Resis tenza alla punt a norm alizz ata Q	Attrit later ale norm alizz ato F(%)	Indic e di porta ment o Ic	Corr ezion e per la press ione litost atica effic ace CQ	Resis tenza alla punt a corre tta ql (KPa )	Coef ficie ridutt ivo (rd)	Resis tenza lique fazio ne (CR R)	Sforz o di tagli norm alizz ato (CS R)	Coef ficie di sicur ezza Fs	Susc ettibi lità di lique fazio ne	Indi ce di lique fazio ne	Risc hio
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1	1.70	44.2	42.2	42.4	2.02	2.23	1.64	88.6	1.02	0.14	0.16	0.89	TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S	1.68	BAS SO_ RES
2	1.90	46.6	42.7	14.8	5.16	2.80	1.89	88.6	1.02	0.14	0.16	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
3	2.10	49.2	43.3	14.8	4.13	2.74	1.87	88.6	1.01	0.14	0.16	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
4	2.30	51.9	44.0	10.8	4.96	2.89	1.91	88.6	1.01	0.14	0.16	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU	1.68	MO LTO BAS SO_ RES

5	2.50	54.7	44.9	7.89	6.30	3.07	1.95	88.6	1.00	0.14	0.16	--	EFA ZIO NE_ RES TER 1.68 REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
		33	26	5	6	0	5425	14	9	8	5			
6	2.70	57.6	45.8	7.89	4.44	2.97	1.92	88.6	1.00	0.14	0.16	--	EFA ZIO NE_ RES TER 1.68 REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
		14	46	5	5	9	6513	14	5	8	5			
7	2.90	60.5	46.8	8.88	6.31	3.04	1.87	88.6	1.00	0.14	0.16	--	EFA ZIO NE_ RES TER 1.68 REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
		70	40	2	4	5	431	14	1	8	5			
8	3.10	63.5	47.9	8.88	5.61	3.01	1.84	88.6	0.99	0.14	0.16	--	EFA ZIO NE_ RES TER 1.68 REN O_N ON_ SUS	MO LTO BAS SO_ RES
		91	00	2	9	9	3961	14	6	8	5			

9	3.30	66.6	49.0	5.92	5.06	3.13	1.87	88.6	0.99	0.14	0.16	--	CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
		69	17	2	3	5	7524	14	2	8	5		REN O_ N ON_ SUS		
10	3.50	69.7	50.1	12.8	3.33	2.76	1.72	88.6	0.98	0.14	0.16	--	CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
		96	82	30	3	7	213	14	7	8	5		REN O_ N ON_ SUS		
11	3.70	72.9	51.3	12.8	3.74	2.80	1.69	88.6	0.98	0.14	0.16	--	CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
		65	91	30	9	6	3893	14	3	8	5		REN O_ N ON_ SUS		
													CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES		

12	3.90	76.1	52.6	9.86	2.92	2.83	1.70	88.6	0.97	0.14	0.16	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
		72	36	9	3	5	2968	14	8	8	5				
13	4.10	79.4	53.9	11.8	5.35	2.94	1.64	88.6	0.97	0.14	0.16	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
		12	15	43	4	6	7866	14	4	8	5				
14	4.30	82.6	55.2	9.86	3.59	2.90	1.64	88.6	0.96	0.14	0.16	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
		80	22	9	7	4	3265	14	9	8	5				
15	4.50	85.9	56.5	18.7	4.02	2.73	1.53	88.6	0.96	0.14	0.16	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L	1.68	MO LTO BAS SO_ RES
		74	55	52	4	1	3316	14	4	8	5				

16	4.70	89.2	57.9	8.88	3.20	2.92	1.59	88.6	0.95	0.14	0.16	--	IQU EFA ZIO NE_ RES TER 1.68	MO LTO BAS SO_ RES
		91	10	2	7	7	6534	14	9	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
17	4.90	92.6	59.2	21.7	4.17	2.70	1.46	88.6	0.95	0.14	0.16	--	TER 1.68	MO LTO BAS SO_ RES
		28	85	12	6	7	83	14	4	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
18	5.10	95.9	60.6	10.8	4.08	2.93	1.51	88.6	0.94	0.14	0.16	--	TER 1.68	MO LTO BAS SO_ RES
		83	79	56	4	4	9377	14	9	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
19	5.30	99.3	62.0	8.88	4.12	3.01	1.51	88.6	0.94	0.14	0.16	--	TER 1.68	MO LTO BAS SO_ RES
		54	89	2	2	6	1383	14	4	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	

															SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	RES
20	5.50	102. 739	63.5 13	7.89 5	6.74 1	3.20 0	1.49 4565	88.6 14	0.93 9	0.14 8	0.16 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES	
21	5.70	106. 138	64.9 50	6.90 8	6.90 4	3.26 4	1.47 7719	88.6 14	0.93 4	0.14 8	0.16 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES	
22	5.90	109. 549	66.4 00	7.89 5	4.77 9	3.12 2	1.44 1087	88.6 14	0.92 9	0.14 8	0.16 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES	

23	6.10	112.971	67.860	8.882	6.734	3.179	1.407446	88.614	0.924	0.148	0.165	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
24	6.30	116.402	69.330	6.908	7.025	3.293	1.398845	88.614	0.919	0.148	0.165	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
25	6.50	119.843	70.810	14.804	6.376	2.999	1.327658	88.614	0.913	0.148	0.165	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
26	6.70	123.292	72.298	12.830	6.119	3.042	1.315584	88.614	0.908	0.148	0.165	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES



															ON_	SO_
															SUS	RES
															CET	
															TIBI	
															LE_	
															DI_L	
															IQU	
															EFA	
															ZIO	
															NE_	
															RES	
31	7.70	140.	79.8	12.8	5.08	3.02	1.21	88.6	0.88	0.14	0.16	--	1.68	TER	MO	
		642	41	30	9	1	6796	14	1	8	5			REN	LTO	
														O_N	BAS	
														ON_	SO_	
														SUS	RES	
														CET		
														TIBI		
														LE_		
														DI_L		
														IQU		
														EFA		
														ZIO		
														NE_		
														RES		
32	7.90	144.	81.3	12.8	5.88	3.06	1.19	88.6	0.87	0.14	0.16	--	1.68	TER	MO	
		130	67	30	3	7	8532	14	6	8	5			REN	LTO	
														O_N	BAS	
														ON_	SO_	
														SUS	RES	
														CET		
														TIBI		
														LE_		
														DI_L		
														IQU		
														EFA		
														ZIO		
														NE_		
														RES		
33	8.10	147.	82.8	14.8	5.84	3.02	1.17	88.6	0.87	0.14	0.16	--	1.68	TER	MO	
		622	98	04	2	0	6207	14	0	8	5			REN	LTO	
														O_N	BAS	
														ON_	SO_	
														SUS	RES	
														CET		
														TIBI		
														LE_		
														DI_L		
														IQU		
														EFA		
														ZIO		

34	8.30	151.119	84.434	15.791	5.522	2.986	1.157403	88.614	0.865	0.148	0.165	--	NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
35	8.50	154.620	85.974	15.791	5.535	2.992	1.141143	88.614	0.859	0.148	0.165	--	NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
36	8.70	158.126	87.518	13.817	4.912	3.013	1.128248	88.614	0.854	0.148	0.165	--	NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
37	8.90	161.635	89.066	16.778	6.890	3.045	1.108575	88.614	0.848	0.148	0.165	--	NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES



															O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES
42	9.90	179. 231	96.8 55	23.6 86	6.75 4	2.94 5	1.03 4815	88.6 14	0.82 1	0.14 8	0.16 5	--	TER 1.68	MO LTO BAS SO_ RES		
														O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES	
43	10.1 0	182. 759	98.4 22	22.6 99	6.80 1	2.96 5	1.02 2541	88.6 14	0.81 5	0.14 8	0.16 5	--	TER 1.68	MO LTO BAS SO_ RES		
														O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES	
44	10.3 0	186. 290	99.9 91	15.7 91	8.06 4	3.14 8	1.01 0931	88.6 14	0.81 0	0.14 8	0.16 5	--	TER 1.68	MO LTO BAS SO_ RES		
														O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA	BAS SO_ RES	

45	10.5	189.	101.	17.7	8.01	3.10	0.99	88.6	0.80	0.14	0.16	--	ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	823	563	65	2	8	8109	14	4	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		
46	10.7	193.	103.	17.7	7.46	3.09	0.98	88.6	0.79	0.14	0.16	--	ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	359	137	65	9	2	5781	14	9	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		
47	10.9	196.	104.	19.7	6.54	3.02	0.97	88.6	0.79	0.14	0.16	--	ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	896	714	38	4	0	4200	14	3	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		
48	11.1	200.	106.	18.7	7.47	3.08	0.96	88.6	0.78	0.14	0.16	--	ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	436	292	52	3	2	2269	14	8	8	5		REN O_N ON_ SUS CET		

49	11.3	203.	107.	18.7	6.60	3.05	0.95	88.6	0.78	0.14	0.16	--	TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	978	873	52	4	0	0822 4	14	2	8	5		REN O_N ON_ SUS CET		
50	11.5	207.	109.	14.8	6.80	3.15	0.93	88.6	0.77	0.14	0.16	--	TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	522	455	04	9	3	7267 1	14	7	8	5		REN O_N ON_ SUS CET		
51	11.7	211.	111.	10.8	7.76	3.31	0.92	88.6	0.77	0.14	0.16	--	TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	067	040	56	2	9	2541 2	14	1	8	5		REN O_N ON_ SUS CET		
52	11.9	214.	112.	10.8	5.19	3.21	0.91	88.6	0.76	0.14	0.16	--	TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER	1.68	MO

	0	615	626	56	5	7	0943 9	14	6	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES		LTO BAS SO_ RES
53	12.1 0	218. 164	114. 213	8.88 2	4.84 0	3.29 5	0.89 7050 9	88.6 14	0.76 0	0.14 8	0.16 5	--	TER 1.68 REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
54	12.3 0	221. 715	115. 803	10.8 56	4.66 8	3.20 0	0.88 8507 8	88.6 14	0.75 5	0.14 8	0.16 5	--	TER 1.68 REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
55	12.5 0	225. 267	117. 394	16.7 78	5.49 3	3.06 8	0.88 4914	88.6 14	0.74 9	0.14 8	0.16 5	--	TER 1.68 REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU	1.68	MO LTO BAS SO_ RES

56	12.7	228.	118.	18.7	5.98	3.05	0.87	88.6	0.74	0.14	0.16	--	EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	821	986	52	4	3	7036	14	4	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		
57	12.9	232.	120.	18.7	4.73	2.99	0.86	88.6	0.73	0.14	0.16	--	TER	1.68	MO
	0	376	580	52	7	2	7331	14	9	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		LTO BAS SO_ RES
58	13.1	235.	122.	13.8	6.35	3.20	0.85	88.6	0.73	0.14	0.16	--	TER	1.68	MO
	0	933	176	17	7	0	1209	14	3	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		LTO BAS SO_ RES
59	13.3	239.	123.	12.8	7.63	3.28	0.83	88.6	0.72	0.14	0.16	--	TER	1.68	MO
	0	491	772	30	8	7	9916	14	8	8	5		REN O_N ON_ SUS		LTO BAS SO_ RES

60	13.5	243.	125.	15.7	9.80	3.27	0.83	88.6	0.72	0.14	0.16	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	050	370	91	1	9	5121	14	3	8	5		O_ ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES		
							9								
61	13.7	246.	126.	20.7	7.06	3.08	0.83	88.6	0.71	0.14	0.16	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	610	969	25	8	4	2960	14	8	8	5		O_ ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES		
							6								
62	13.9	250.	128.	27.6	5.21	2.89	0.83	88.6	0.71	0.14	0.16	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	172	569	34	6	3	2820	14	3	8	5		O_ ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES		
							1								

63	14.1	253.	130.	21.7	6.26	3.04	0.81	88.6	0.70	0.14	0.16	--	TER	1.68	MO
	0	735	171	12	8	0	7143	14	7	8	5		REN		LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
64	14.3	257.	131.	17.7	6.15	3.11	0.80	88.6	0.70	0.14	0.16	--	TER	1.68	MO
	0	298	773	65	8	7	2810	14	2	8	5		REN		LTO
							3						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
65	14.5	260.	133.	16.7	7.36	3.19	0.79	88.6	0.69	0.14	0.16	--	TER	1.68	MO
	0	863	377	78	6	5	2726	14	7	8	5		REN		LTO
							6						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
66	14.7	264.	134.	21.7	4.54	2.96	0.79	88.6	0.69	0.14	0.16	--	TER	1.68	MO
	0	429	981	12	6	1	2558	14	2	8	5		REN		LTO
							9						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		

67	14.9	267.	136.	17.7	5.61	3.10	0.77	88.6	0.68	0.14	0.16	--	IQU EFA ZIO NE_ RES TER	1.68	MO LTO BAS SO_ RES
	0	996	587	65	4	4	8074	14	7	8	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		
68	15.1	271.	138.	17.7	6.54	3.15	0.77	88.6	0.68	0.14	0.16	--	TER	1.68	MO
	0	564	194	65	3	1	0154	14	2	8	5		REN		LTO
							6						O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES
69	15.3	275.	139.	12.8	7.90	3.34	0.75	88.6	0.67	0.14	0.16	--	TER	1.68	MO
	0	133	801	30	3	5	2069	14	7	8	5		REN		LTO
							1						O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES
70	15.5	278.	141.	35.5	5.69	2.85	0.78	88.6	0.67	0.14	0.16	--	TER	1.68	MO
	0	702	409	29	1	5	1611	14	2	8	5		REN		LTO
							8						O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES

															SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	RES
71	15.7 0	282. 273	143. 018	21.7 12	7.66 5	3.12 9	0.75 4551 4	88.6 14	0.66 7	0.14 8	0.16 5	--	TER REN O_ ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES	
72	15.9 0	285. 844	144. 628	19.7 38	7.75 9	3.17 3	0.74 3668 5	88.6 14	0.66 3	0.14 8	0.16 5	--	TER REN O_ ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES	
73	16.1 0	289. 416	146. 239	25.6 60	5.36 7	2.96 9	0.74 6926 4	88.6 14	0.65 8	0.14 8	0.16 5	--	TER REN O_ ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES	

74	16.3	292.	147.	27.6	5.86	2.96	0.74	88.6	0.65	0.14	0.16	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
	0	989	850	34	4	9	3246 7	14	3	8	5				
75	16.5	296.	149.	27.6	5.59	2.95	0.73	88.6	0.64	0.14	0.16	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
	0	562	463	34	2	9	6586 1	14	8	8	5				
76	16.7	300.	151.	28.6	4.11	2.86	0.73	88.6	0.64	0.14	0.16	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
	0	137	075	21	6	2	1529 2	14	4	8	5				
77	16.9	303.	152.	17.7	4.47	3.08	0.70	88.6	0.63	0.14	0.16	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	1.68	MO LTO BAS SO_ RES
	0	711	689	65	8	5	4806 3	14	9	8	5				

78	17.1	307.	154.	47.3	2.96	2.58	0.74	74.2	0.63	0.11	0.19	0.60	TER	38.9	MO
	0	287	303	72	0	2	4731	39	5	7	5	2	REN	9	LTO
							4						O_S		ALT
													USC		O_R
													ETTI		ES
													BIL		
													E_DI		
													_LIQ		
													UEF		
													AZI		
													ONE		
													_RE		
													S		
79	17.3	310.	155.	25.6	5.98	3.02	0.70	74.2	0.63	0.11	0.19	--	TER	38.9	MO
	0	863	918	60	5	1	7396	39	0	7	5		REN	9	LTO
							9						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
80	17.5	314.	157.	27.6	5.63	2.97	0.70	74.2	0.62	0.11	0.19	--	TER	38.9	MO
	0	440	534	34	3	8	4667	39	6	7	5		REN	9	LTO
							4						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
81	17.7	318.	159.	32.5	5.03	2.88	0.70	74.2	0.62	0.11	0.19	--	TER	38.9	MO
	0	017	150	68	0	5	6908	39	1	7	5		REN	9	LTO
							2						O_N		BAS
													ON_		SO_

															SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	RES
82	17.9 0	321. 595	160. 766	30.5 95	6.19 1	2.97 2	0.69 7617 8	74.2 39	0.61 7	0.11 7	0.19 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	38.9 9	MO LTO BAS SO_ RES	
83	18.1 0	325. 174	162. 384	27.6 34	5.94 0	3.00 3	0.68 6794 2	74.2 39	0.61 2	0.11 7	0.19 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	38.9 9	MO LTO BAS SO_ RES	
84	18.3 0	328. 753	164. 001	19.7 38	7.95 8	3.22 5	0.66 5123 6	74.2 39	0.60 8	0.11 7	0.19 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	38.9 9	MO LTO BAS SO_ RES	

85	18.5	332.	165.	27.6	7.09	3.06	0.67	74.2	0.60	0.11	0.19	--	RES TER 38.9 REN 9 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES	
	0	333	620	34	2	1	5334 9	39	4	7	5				
86	18.7	335.	167.	39.4	5.75	2.86	0.68	74.2	0.60	0.11	0.19	--	RES TER 38.9 REN 9 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES	
	0	913	238	77	9	7	9155 8	39	0	7	5				
87	18.9	339.	168.	31.5	6.99	3.01	0.67	74.2	0.59	0.11	0.19	--	RES TER 38.9 REN 9 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES	
	0	493	858	82	2	2	1046 6	39	6	7	5				
88	19.1	343.	170.	27.6	7.61	3.09	0.65	74.2	0.59	0.11	0.19	--	RES TER 38.9 REN 9 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES	
	0	074	477	34	1	1	8538 7	39	2	7	5				

															DI_L		
															IQU		
															EFA		
															ZIO		
															NE_		
															RES		
89	19.3	346.	172.	25.6	6.79	3.09	0.64	74.2	0.58	0.11	0.19	--		TER	38.9	MO	
	0	656	098	60	0	0	9360	39	8	7	5		REN	9	LTO		
							2						O_N		BAS		
													ON_		SO_		
													SUS		RES		
													CET				
													TIBI				
													LE_				
													DI_L				
													IQU				
													EFA				
													ZIO				
													NE_				
													RES				
90	19.5	350.	173.	17.7	8.89	3.32	0.62	74.2	0.58	0.11	0.19	--		TER	38.9	MO	
	0	238	718	65	8	3	6367	39	4	7	5		REN	9	LTO		
							6						O_N		BAS		
													ON_		SO_		
													SUS		RES		
													CET				
													TIBI				
													LE_				
													DI_L				
													IQU				
													EFA				
													ZIO				
													NE_				
													RES				
91	19.7	353.	175.	18.7	7.69	3.26	0.62	74.2	0.58	0.11	0.19	--		TER	38.9	MO	
	0	820	339	52	6	3	3299	39	0	7	5		REN	9	LTO		
							3						O_N		BAS		
													ON_		SO_		
													SUS		RES		
													CET				
													TIBI				
													LE_				
													DI_L				
													IQU				
													EFA				
													ZIO				
													NE_				
													RES				
92	19.9	357.	176.	21.7	7.48	3.19	0.62	74.2	0.57	0.11	0.19	--		TER	38.9	MO	
	0	403	961	12	9	6	5026	39	6	7	5		REN	9	LTO		
							3						O_N		BAS		

ON\_  
SUS\_  
CET  
TIBI  
LE\_  
DI\_L  
IQU  
EFA  
ZIO  
NE\_  
RES

SO\_  
RES

IPL (Iwasaki)=0.3 Zcrit=20 m Rischio=Basso

## Metodo di Robertson e Wride (1997)

Il 'metodo di Robertson e Wride' è basato sui risultati di prove CPT (*Cone Penetration Test*) ed utilizza l'indice di comportamento per il tipo di suolo  $I_C$  che viene calcolato mediante l'utilizzo della seguente formula:

$$I_c = \left[ (3,47 - \log_{10} Q)^2 + (\log_{10} R_f + 1,22)^2 \right]^{0,5} \quad (5.0a)$$

$$Q = \frac{q_c - \sigma_{vo}}{Pa} \left( \frac{Pa}{\sigma'_{vo}} \right)^n \quad (5.0b)$$

$$R_f = \frac{f_s}{q_c - \sigma_{vo}} 100 \quad (5.0c)$$

dove:

$q_c$  è la resistenza alla punta misurata

$Pa$  è la tensione di riferimento (1 atmosfera) nelle stesse unità di  $\sigma'_{vo}$

$f_s$  è l'attrito del manicotto

$n$  è un'esponente che dipende dal tipo di suolo.

Inizialmente si assume  $n = 1$ , come per un suolo argilloso e si procede al calcolo di  $I_C$  con la (5.0a).

Se  $I_C > 2,6$  il suolo è probabilmente di tipo argilloso e l'analisi si ferma. Il terreno non si considera a rischio di liquefazione.

Se  $I_C \leq 2,6$ , vuol dire che l'ipotesi assunta è errata, il suolo è di natura granulare,  $Q$  verrà ricalcolato utilizzando la (5.0a) usando come esponente  $n = 0,5$ .

Se è ancora  $I_C \leq 2,6$ , significa che l'ipotesi è giusta e il suolo è probabilmente non plastico e granulare.

Se invece  $I_C > 2,6$ , vuol dire che l'ipotesi è di nuovo errata e il suolo è probabilmente limoso.  $Q$  deve essere nuovamente ricalcolato dalla (2.8b) ponendo  $n = 0,75$ .

Calcolato  $I_C$ , si procede con la correzione della resistenza alla punta misurata  $q_c$  mediante la seguente espressione:

$$q_{c1N} = \frac{q_c}{Pa} \left( \frac{Pa}{\sigma'_{vo}} \right)^n \quad (5.1)$$

Dove l'esponente di sforzo  $n$  è lo stesso utilizzato nel calcolo di  $I_C$ .

La correzione alla resistenza alla punta dovuta al contenuto di materiale fine viene determinata dalla seguente procedura:

### Robertson e Wride classico

$$(q_{c1N})_{cs} = K_c q_{c1N} \quad (5.2a)$$

$$K_c = -0,403 I_c^4 + 5,581 I_c^3 - 21,63 I_c^2 + 33,75 I_c - 17,88 \quad (5.2b)$$

### Robertson e Wride modificato

$$(q_{c1N})_{cs} = q_{c1N} + \Delta q_{c1N} \quad (5.3a)$$

$$\Delta q_{c1N} = \frac{K_c}{1 - K_c} q_{c1N} \quad (5.3b)$$

dove  $K_c$  dipende dal contenuto di fine, FC (%):

$$\begin{aligned} K_c &= 0 && \text{per } FC \leq 5 \\ K_c &= 0,0267(FC - 5) && \text{per } 5 < FC \leq 35 \\ K_c &= 0,8 && \text{per } FC > 35 \end{aligned}$$

FC (%) viene calcolato mediante l'espressione seguente:

$$FC (\%) = 1,75 (I_c)^{3,25} - 3,7 \quad (5.4)$$

La resistenza alla liquefazione per una magnitudo pari a 7,5 (**CRR<sub>7,5</sub>**) si calcola con le espressioni seguenti: se  $(q_{c1N})_{cs} < 50$

$$CRR = 0,833 \left[ \frac{(q_{c1N})_{cs}}{1000} \right] + 0,05 \quad (5.5)$$

se  $50 \leq (q_{c1N})_{cs} < 160$

$$CRR = 93 \left[ \frac{(q_{c1N})_{cs}}{1000} \right]^3 + 0,08 \quad (5.6)$$

Il Rapporto di Tensione Ciclica per eventi sismici di magnitudo 7,5 (**CSR<sub>7,5</sub>**) si determina dalla seguente espressione:

$$\frac{\tau_{av}}{\sigma'_{vo}} = CSR_{7,5} = 0,65 \frac{a_g}{g} \frac{\sigma'_{vo}}{\sigma'_{vo}} r_d \quad (5.7)$$

Per magnitudo diverse occorre introdurre il fattore correttivo **MSF** (*Magnitude Scaling Factor*) come raccomandato dal **NCEER** (vedi Tabella 1)

$$CSR = \frac{CSR_{7,5}}{MSF} \quad (5.8)$$

**Tabella 1-** Fattore di scala della magnitudo derivato da diversi ricercatori

Magnitudo	Seed H.B. & Idriss I.M. (1982)	Ambraseys N.N (1988).	NCEER (Seed R. B. et alii) (1997; 2003)
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5,5	1,43	2,86	2,21
6,0	1,32	2,20	1,77
6,5	1,19	1,69	1,44
7,0	1,08	1,30	1,19
7,5	1,00	1,00	1,00
8,0	0,94	0,67	0,84
8,5	0,89	0,44	0,73

Per determinare il valore del coefficiente riduttivo  $r_d$  vengono utilizzate le formule raccomandate da un gruppo di esperti del **NCEER** (*National Center for Earthquake Engineering Research*):

per  $z < 9,15$  m

$$r_d = 1,0 - 0,00765 z \quad (5.9)$$

per  $9,15 \leq z < 23$  m

$$r_d = 1,174 - 0,00267 z \quad (5.10)$$

Il fattore di sicurezza alla liquefazione **FS** viene determinato dalla relazione:

$$FS = \frac{CRR}{CSR} \quad (5.11)$$

mentre l'indice e il rischio di liquefazione vengono calcolati con il metodo di **Iwasaki et alii** (1978; 1984).

## DATI GENERALI

### PROGETTO E LOCALIZZAZIONE

Titolo lavoro: PUA "Via Romana" - CPT1

Cliente: CBL srl

Indirizzo, Coordinate: Via Romana - Medolla (MO)

Data 17/07/2020

Normativa: Norme Tecniche Costruzioni, Circolare 2 febbraio 2009, n.617

Fattore sicurezza normativa	1
<b>FALDA</b>	
Profondità falda idrica	1.5 m
<b>CARICHI SUL PIANO CAMPAGNA</b>	
Base	1 m
Lunghezza	10 m
Carico in superficie	100 kPa
Metodo calcolo stato tensionale	Bussinesq
Coefficiente di Poisson	0.25
<b>DATI SIMICI</b>	
Accelerazione Bedrock	0.15

Tipo Suolo: C-Sabbie, ghiaie mediamente addensate, argille di media consistenza Vs30=180-360  
Morfologia: T1-Superficie pianeggiante, pendii e rilievi isolati con inclinazione media  $i \leq 15^\circ$

Coefficiente amplificazione stratigrafica (SS)	1.58
Coefficiente amplificazione topografica (ST)	1
Magnitudo momento sismico (Mw)	6.14
Peak ground acceleration (PGA)	0.237

#### PARAMETRI GEOTECNICI

Strato Nr	Descrizi one	Quota iniziale (m)	Quota finale (m)	Peso unità volume (KN/mc )	Peso unità volume saturo (KN/mc )	Numero colpi medio (Nspt)	D50 granuli (mm)	Resiste nza qc (KPa)	Resiste nza attrito laterale fs (KPa)	Velocit à onde di taglio Vs (m/s)
1		0	0.2	18	0	0	0	1000	53	0
2		0.2	0.4	18	0	0	0	1000	27	0
3		0.4	0.6	18	0	0	0	1200	46	0
4		0.6	0.8	18	0	0	0	1200	55	0
5		0.8	1	18	0	0	0	1100	46	0
6		1	1.2	18	0	0	0	2100	40	0
7		1.2	1.4	18	0	0	0	2100	68	0
8		1.4	1.6	18	0	0	0	2200	27	0
9		1.6	1.8	18	0	0	0	4300	86	0
10		1.8	2	18	0	0	0	1500	75	0
11		2	2.2	18	0	0	0	1500	60	0
12		2.2	2.4	18	0	0	0	1100	52	0
13		2.4	2.6	18	0	0	0	800	47	0
14		2.6	2.8	18	0	0	0	800	33	0
15		2.8	3	18	0	0	0	900	53	0
16		3	3.2	18	0	0	0	900	47	0
17		3.2	3.4	18	0	0	0	600	27	0
18		3.4	3.6	18	0	0	0	1300	41	0
19		3.6	3.8	18	0	0	0	1300	46	0
20		3.8	4	18	0	0	0	1000	27	0
21		4	4.2	18	0	0	0	1200	60	0
22		4.2	4.4	18	0	0	0	1000	33	0
23		4.4	4.6	18	0	0	0	1900	73	0
24		4.6	4.8	18	0	0	0	900	26	0
25		4.8	5	18	0	0	0	2200	88	0
26		5	5.2	18	0	0	0	1100	41	0
27		5.2	5.4	18	0	0	0	900	33	0
28		5.4	5.6	18	0	0	0	800	47	0
29		5.6	5.8	18	0	0	0	700	41	0
30		5.8	6	18	0	0	0	800	33	0
31		6	6.2	18	0	0	0	900	53	0
32		6.2	6.4	18	0	0	0	700	41	0
33		6.4	6.6	18	0	0	0	1500	88	0
34		6.6	6.8	18	0	0	0	1300	72	0
35		6.8	7	18	0	0	0	1100	79	0

36	7	7.2	18	0	0	0	1400	88	0
37	7.2	7.4	18	0	0	0	1200	60	0
38	7.4	7.6	18	0	0	0	1300	59	0
39	7.6	7.8	18	0	0	0	1300	59	0
40	7.8	8	18	0	0	0	1300	68	0
41	8	8.2	18	0	0	0	1500	79	0
42	8.2	8.4	18	0	0	0	1600	80	0
43	8.4	8.6	18	0	0	0	1600	80	0
44	8.6	8.8	18	0	0	0	1400	61	0
45	8.8	9	18	0	0	0	1700	106	0
46	9	9.2	18	0	0	0	1600	114	0
47	9.2	9.4	18	0	0	0	2100	124	0
48	9.4	9.6	18	0	0	0	2400	150	0
49	9.6	9.8	18	0	0	0	2400	150	0
50	9.8	10	18	0	0	0	2400	150	0
51	10	10.2	18	0	0	0	2300	144	0
52	10.2	10.4	18	0	0	0	1600	114	0
53	10.4	10.6	18	0	0	0	1800	129	0
54	10.6	10.8	18	0	0	0	1800	120	0
55	10.8	11	18	0	0	0	2000	118	0
56	11	11.2	18	0	0	0	1900	127	0
57	11.2	11.4	18	0	0	0	1900	112	0
58	11.4	11.6	18	0	0	0	1500	88	0
59	11.6	11.8	18	0	0	0	1100	69	0
60	11.8	12	18	0	0	0	1100	46	0
61	12	12.2	18	0	0	0	900	33	0
62	12.2	12.4	18	0	0	0	1100	41	0
63	12.4	12.6	18	0	0	0	1700	81	0
64	12.6	12.8	18	0	0	0	1900	100	0
65	12.8	13	18	0	0	0	1900	79	0
66	13	13.2	18	0	0	0	1400	74	0
67	13.2	13.4	18	0	0	0	1300	81	0
68	13.4	13.6	18	0	0	0	1600	133	0
69	13.6	13.8	18	0	0	0	2100	131	0
70	13.8	14	18	0	0	0	2800	133	0
71	14	14.2	18	0	0	0	2200	122	0
72	14.2	14.4	18	0	0	0	1800	95	0
73	14.4	14.6	18	0	0	0	1700	106	0
74	14.6	14.8	18	0	0	0	2200	88	0
75	14.8	15	18	0	0	0	1800	86	0
76	15	15.2	18	0	0	0	1800	100	0
77	15.2	15.4	18	0	0	0	1300	81	0
78	15.4	15.6	18	0	0	0	3600	189	0
79	15.6	15.8	18	0	0	0	2200	147	0
80	15.8	16	18	0	0	0	2000	133	0
81	16	16.2	18	0	0	0	2600	124	0
82	16.2	16.4	18	0	0	0	2800	147	0
83	16.4	16.6	18	0	0	0	2800	140	0
84	16.6	16.8	18	0	0	0	2900	107	0
85	16.8	17	18	0	0	0	1800	67	0
86	17	17.2	18	0	0	0	4800	133	0

87	17.2	17.4	18	0	0	0	2600	137	0
88	17.4	17.6	18	0	0	0	2800	140	0
89	17.6	17.8	18	0	0	0	3300	150	0
90	17.8	18	18	0	0	0	3100	172	0
91	18	18.2	18	0	0	0	2800	147	0
92	18.2	18.4	18	0	0	0	2000	133	0
93	18.4	18.6	18	0	0	0	2800	175	0
94	18.6	18.8	18	0	0	0	4000	211	0
95	18.8	19	18	0	0	0	3200	200	0
96	19	19.2	18	0	0	0	2800	187	0
97	19.2	19.4	18	0	0	0	2600	153	0
98	19.4	19.6	18	0	0	0	1800	129	0
99	19.6	19.8	18	0	0	0	1900	119	0
100	19.8	20	18	0	0	0	2200	138	0

Correzione per la magnitudo (MSF) 1.67

Nr.	Prof ondit à dal p.c. (m)	Press ione litost tica (KPa )	Press ione verti cale effett (KPa )	Resis tenza punta norm alizz ata Q	Attrit o later ale norm alizz ato F(%)	Indic e di porta ment o Ic CQ	Corr ezion e per la press ione litost tica effic ace )	Resis tenza punta corre tta qc1 (KPa )	Coef ficie ridutt ivo (rd)	Resis tenza lique fazio (CR R)	Sforz o di tagli norm alizz ato (CS R)	Coef ficie di sicur zza Fs	Susc ettibi lità di lique fazio ne	Indi ce di lique fazio ne	Risc hio
1	1.70	44.2 20	42.2 59	66.1 47	2.02 1	Ic1= 2.12 Ic=2. 25	1.53 8299	113. 368	0.98 7	0.21 6	0.09 5	2.26 0	TER REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
2	1.90	46.6 70	42.7 47	33.9 98	5.16 1	Ic1= 2.74 Ic=2. 74	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER REN O_N ON_ SUS CET TIBI LE_ RES	--	MO LTO BAS SO_ RES

3	2.10	49.2	43.3	33.4	4.13	Ic1= 1.53 2.68 Ic=2. 68	0.00	0.00	0.21	0.09	--	DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
4	2.30	51.9	44.0	23.7	4.96	Ic1= 1.53 2.84 Ic=2. 84	0.00	0.00	0.21	0.09	--	DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
5	2.50	54.7	44.9	16.5	6.30	Ic1= 1.53 3.02 Ic=3. 02	0.00	0.00	0.21	0.09	--	DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
6	2.70	57.6	45.8	16.1	4.44	Ic1= 1.53 2.93 Ic=2.	0.00	0.00	0.21	0.09	--	DI_L IQU EFA ZIO NE_ RES TER -- REN O_N	MO LTO BAS

															ON_	SO_
															SUS	RES
															CET	
															TIBI	
															LE_	
															DI_	
															L	
															IQU	
															EFA	
															ZIO	
															NE_	
															RES	
7	2.90	60.5	46.8	17.9	6.31	Ic1=	1.53	0.00	0.00	0.21	0.09	--		TER	--	MO
		70	40	21	4	3.00	8299	0	0	6	5			REN		LTO
						Ic=3.								O_N		BAS
						00								ON_		SO_
														SUS		RES
														CET		
														TIBI		
														LE_		
														DI_		
														L		
														IQU		
														EFA		
														ZIO		
														NE_		
														RES		
8	3.10	63.5	47.9	17.4	5.61	Ic1=	1.53	0.00	0.00	0.21	0.09	--		TER	--	MO
		91	00	61	9	2.97	8299	0	0	6	5			REN		LTO
						Ic=2.								O_N		BAS
						97								ON_		SO_
														SUS		RES
														CET		
														TIBI		
														LE_		
														DI_		
														L		
														IQU		
														EFA		
														ZIO		
														NE_		
														RES		
9	3.30	66.6	49.0	10.8	5.06	Ic1=	1.53	0.00	0.00	0.21	0.09	--		TER	--	MO
		69	17	81	3	3.10	8299	0	0	6	5			REN		LTO
						Ic=3.								O_N		BAS
						10								ON_		SO_
														SUS		RES
														CET		
														TIBI		
														LE_		
														DI_		
														L		
														IQU		
														EFA		
														ZIO		

10	3.50	69.7	50.1	24.5	3.33	Ic1= 1.53 2.71 Ic=2. 71	0.00	0.00	0.21	0.09	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
11	3.70	72.9	51.3	23.8	3.74	Ic1= 1.53 2.76 Ic=2. 76	0.00	0.00	0.21	0.09	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
12	3.90	76.1	52.6	17.5	2.92	Ic1= 1.53 2.79 Ic=2. 79	0.00	0.00	0.21	0.09	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
13	4.10	79.4	53.9	20.7	5.35	Ic1= 1.53 2.90 Ic=2. 90	0.00	0.00	0.21	0.09	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES

14	4.30	82.6	55.2	16.6	3.59	Ic1= 1.53 Ic=2. 2.87 87	0.00	0.00	0.21	0.09	--	LE_ DI_ IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
15	4.50	85.9	56.5	32.0	4.02	Ic1= 1.53 Ic=2. 2.68 68	0.00	0.00	0.21	0.09	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
16	4.70	89.2	57.9	14.0	3.20	Ic1= 1.53 Ic=2. 2.89 89	0.00	0.00	0.21	0.09	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
17	4.90	92.6	59.2	35.5	4.17	Ic1= 1.53 2.66	0.00	0.00	0.21	0.09	--	TER -- REN	MO LTO

						Ic=2. 66									O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES
18	5.10	95.9 83	60.6 79	16.5 46	4.08 4	Ic1= 2.90 Ic=2. 90	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER --	MO LTO BAS SO_ RES		
														O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES	
19	5.30	99.3 54	62.0 89	12.8 95	4.12 2	Ic1= 2.99 Ic=2. 99	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER --	MO LTO BAS SO_ RES		
														O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES	
20	5.50	102. 739	63.5 13	10.9 78	6.74 1	Ic1= 3.18 Ic=3. 18	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER --	MO LTO BAS SO_ RES		
														O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA	BAS SO_ RES	

21	5.70	106.138	64.950	9.143	6.904	Ic1= 3.25 Ic=3.25	1.538299	0.000	0.000	0.216	0.095	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
22	5.90	109.549	66.400	10.398	4.779	Ic1= 3.10 Ic=3.10	1.538299	0.000	0.000	0.216	0.095	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
23	6.10	112.971	67.860	11.598	6.734	Ic1= 3.16 Ic=3.16	1.538299	0.000	0.000	0.216	0.095	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
24	6.30	116.402	69.330	8.418	7.025	Ic1= 3.28 Ic=3.28	1.538299	0.000	0.000	0.216	0.095	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET	MO LTO BAS SO_ RES

25	6.50	119.843	70.810	19.491	6.376	Ic1= 2.98 Ic=2. 98	1.53	0.00	0.00	0.21	0.09	--	TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
26	6.70	123.292	72.298	16.276	6.119	Ic1= 3.02 Ic=3. 02	1.53	0.00	0.00	0.21	0.09	--	TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
27	6.90	126.749	73.793	13.189	8.117	Ic1= 3.17 Ic=3. 17	1.53	0.00	0.00	0.21	0.09	--	TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
28	7.10	130.	75.2	16.8	6.93	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER --	MO

	213	96	64	0	3.05	8299	0	0	6	5			REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	LTO BAS SO_ RES
					Ic=3. 05									
29	7.30	133. 683	76.8 05	13.8 83	5.62 7	Ic1= 3.05	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
						Ic=3. 05								
30	7.50	137. 160	78.3 20	14.8 47	5.07 4	Ic1= 3.00	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
						Ic=3. 00								
31	7.70	140. 642	79.8 41	14.5 21	5.08 9	Ic1= 3.01	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU	MO LTO BAS SO_ RES
						Ic=3. 01								

32	7.90	144.130	81.367	14.206	5.883	Ic1= 3.05 Ic=3.05	1.538299	0.000	0.000	0.216	0.095	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
33	8.10	147.622	82.898	16.314	5.842	Ic1= 3.01 Ic=3.01	1.538299	0.000	0.000	0.216	0.095	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
34	8.30	151.119	84.434	17.160	5.522	Ic1= 2.97 Ic=2.97	1.538299	0.000	0.000	0.216	0.095	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
35	8.50	154.620	85.974	16.812	5.535	Ic1= 2.98 Ic=2.98	1.538299	0.000	0.000	0.216	0.095	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES



39	9.30	168. 664	92.1 72	20.9 54	6.42 0	Ic1= 2.95 Ic=2. 95	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
40	9.50	172. 183	93.7 30	23.7 68	6.73 3	Ic1= 2.93 Ic=2. 93	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
41	9.70	175. 706	95.2 91	23.3 42	6.74 4	Ic1= 2.94 Ic=2. 94	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
42	9.90	179. 231	96.8 55	22.9 29	6.75 4	Ic1= 2.94 Ic=2. 94	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L	--	MO LTO BAS SO_ RES

43	10.1	182.	98.4	21.5	6.80	Ic1= 1.53 2.96 Ic=2. 96	0.00	0.00	0.21	0.09	--	IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
44	10.3	186.	99.9	14.1	8.06	Ic1= 1.53 3.15 Ic=3. 15	0.00	0.00	0.21	0.09	--	IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
45	10.5	189.	101.	15.8	8.01	Ic1= 1.53 3.11 Ic=3. 11	0.00	0.00	0.21	0.09	--	IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
46	10.7	193.	103.	15.5	7.46	Ic1= 1.53 3.09 Ic=3. 09	0.00	0.00	0.21	0.09	--	IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES

															SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	RES
47	10.9 0	196. 896	104. 714	17.2 19	6.54 4	Ic1= 3.02 Ic=3. 02	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES		
48	11.1 0	200. 436	106. 292	15.9 90	7.47 3	Ic1= 3.09 Ic=3. 09	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES		
49	11.3 0	203. 978	107. 873	15.7 22	6.60 4	Ic1= 3.05 Ic=3. 05	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES		

50	11.5 0	207. 522	109. 455	11.8 08	6.80 9	Ic1= 3.16 Ic=3. 16	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
51	11.7 0	211. 067	111. 040	8.00 6	7.76 2	Ic1= 3.32 Ic=3. 32	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
52	11.9 0	214. 615	112. 626	7.86 1	5.19 5	Ic1= 3.22 Ic=3. 22	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
53	12.1 0	218. 164	114. 213	5.97 0	4.84 0	Ic1= 3.30 Ic=3. 30	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES



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58 13.1 235. 122. 9.52 6.35 Ic1= 1.53 0.00 0.00 0.21 0.09 --
0 933 176 8 7 3.21 8299 0 0 6 5
Ic=3.
21

TER -- MO
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O\_N BAS
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SUS RES

CET
TIBI
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RES

59 13.3 239. 123. 8.56 7.63 Ic1= 1.53 0.00 0.00 0.21 0.09 --
0 491 772 8 8 3.30 8299 0 0 6 5
Ic=3.
30

TER -- MO
REN LTO
O\_N BAS
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SUS RES

CET
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RES

60 13.5 243. 125. 10.8 9.80 Ic1= 1.53 0.00 0.00 0.21 0.09 --
0 050 370 24 1 3.29 8299 0 0 6 5
Ic=3.
29

TER -- MO
REN LTO
O\_N BAS
ON\_ SO\_
SUS RES

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ZIO

61	13.7 0	246. 610	126. 969	14.5 97	7.06 8	Ic1= 3.10 Ic=3. 10	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
62	13.9 0	250. 172	128. 569	19.8 32	5.21 6	Ic1= 2.91 Ic=2. 91	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
63	14.1 0	253. 735	130. 171	14.9 52	6.26 8	Ic1= 3.06 Ic=3. 06	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
64	14.3 0	257. 298	131. 773	11.7 07	6.15 8	Ic1= 3.13 Ic=3. 13	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES

65	14.5	260.	133.	10.7	7.36	Ic1=	1.53	0.00	0.00	0.21	0.09	--	LE_ DI_ IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
	0	863	377	90	6	3.21	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	
						Ic=3. 21								
66	14.7	264.	134.	14.3	4.54	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO
	0	429	981	40	6	2.98	8299	0	0	6	5		REN	LTO
						Ic=2. 98							O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES
67	14.9	267.	136.	11.2	5.61	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO
	0	996	587	16	4	3.12	8299	0	0	6	5		REN	LTO
						Ic=3. 12							O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES
68	15.1	271.	138.	11.0	6.54	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO
	0	564	194	60	3	3.17	8299	0	0	6	5		REN	LTO

						Ic=3. 17								O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES
69	15.3 0	275. 133	139. 801	7.33 1	7.90 3	Ic1= 3.36 Ic=3. 36	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN	MO LTO	
													O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES	
70	15.5 0	278. 702	141. 409	23.4 87	5.69 1	Ic1= 2.88 Ic=2. 88	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN	MO LTO	
													O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	BAS SO_ RES	
71	15.7 0	282. 273	143. 018	13.4 09	7.66 5	Ic1= 3.15 Ic=3. 15	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TER -- REN	MO LTO	
													O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA	BAS SO_ RES	

72	15.9 0	285. 844	144. 628	11.8 52	7.75 9	Ic1= 3.19 Ic=3. 19	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
73	16.1 0	289. 416	146. 239	15.8 00	5.36 7	Ic1= 2.99 Ic=2. 99	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
74	16.3 0	292. 989	147. 850	16.9 56	5.86 4	Ic1= 3.00 Ic=3. 00	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
75	16.5 0	296. 562	149. 463	16.7 50	5.59 2	Ic1= 2.99 Ic=2. 99	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET	MO LTO BAS SO_ RES

76	16.7 0	300. 137	151. 075	17.2 09	4.11 6	Ic1= 2.89 Ic=2. 89	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
77	16.9 0	303. 711	152. 689	9.80 0	4.47 8	Ic1= 3.11 Ic=3. 11	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
78	17.1 0	307. 287	154. 303	29.1 16	2.96 0	Ic1= 2.62 Ic=2. 62	1.53 8299	0.00 0	0.00 0	0.21 6	0.09 5	--	TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
79	17.3	310.	155.	14.6	5.98	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER --	MO

	0	863	918	82	5	3.05	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	LTO BAS SO_ RES
						Ic=3. 05								
80	17.5	314.	157.	15.7	5.63	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO
	0	440	534	78	3	3.01	8299	0	0	6	5		REN	LTO
						Ic=3. 01							O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	BAS SO_ RES
81	17.7	318.	159.	18.7	5.03	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO
	0	017	150	37	0	2.92	8299	0	0	6	5		REN	LTO
						Ic=2. 92							O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	BAS SO_ RES
82	17.9	321.	160.	17.2	6.19	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO
	0	595	766	82	1	3.01	8299	0	0	6	5		REN	LTO
						Ic=3. 01							O_N ON_ SUS CET TIBI LE_ DI_ L IQU	BAS SO_ RES

83	18.1	325.	162.	15.2	5.94	Ic1=	1.53	0.00	0.00	0.21	0.09	--	EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
	0	174	384	41	0	Ic=3. 03	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
84	18.3	328.	164.	10.1	7.95	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO LTO BAS SO_ RES
	0	753	001	90	8	Ic=3. 25	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
85	18.5	332.	165.	14.9	7.09	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO LTO BAS SO_ RES
	0	333	620	00	2	Ic=3. 09	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
86	18.7	335.	167.	21.9	5.75	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO LTO BAS SO_ RES
	0	913	238	09	9	Ic=2. 91	8299	0	0	6	5		REN O_N ON_ SUS	

87	18.9	339.	168.	16.9	6.99	Ic1=	1.53	0.00	0.00	0.21	0.09	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
	0	493	858	40	2	3.05	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	
						Ic=3. 05								
88	19.1	343.	170.	14.4	7.61	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO LTO BAS SO_ RES
	0	074	477	12	1	3.12	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	
						Ic=3. 12								
89	19.3	346.	172.	13.0	6.79	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER --	MO LTO BAS SO_ RES
	0	656	098	93	0	3.12	8299	0	0	6	5		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	
						Ic=3. 12								

90	19.5	350.	173.	8.34	8.89	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER	--	MO
	0	238	718	5	8	3.35	8299	0	0	6	5		REN		LTO
						Ic=3.							O_N		BAS
						35							ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
91	19.7	353.	175.	8.81	7.69	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER	--	MO
	0	820	339	8	6	3.29	8299	0	0	6	5		REN		LTO
						Ic=3.							O_N		BAS
						29							ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
92	19.9	357.	176.	10.4	7.48	Ic1=	1.53	0.00	0.00	0.21	0.09	--	TER	--	MO
	0	403	961	12	9	3.23	8299	0	0	6	5		REN		LTO
						Ic=3.							O_N		BAS
						23							ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		

IPL (Iwasaki)=0 Zcrit=20 m Rischio=Molto basso

### Metodo di Idriss & Boulanger (2014)

Nel metodo proposto da **Idriss e Boulanger** l'indice di comportamento  $I_C$  per il tipo di suolo è ricavato con le formule riportate di seguito:

$$I_c = \left[ (\log_{10} Q - 3,47)^2 + (\log_{10} R_f + 1,22)^2 \right]^{0,5} \quad (6.0a)$$

$$Q = \frac{q_c - \sigma_{vo}}{Pa} \left( \frac{Pa}{\sigma'_{vo}} \right)^n \quad (6.0b)$$

$$R_f = \frac{f_s}{q_c - \sigma_{vo}} 100 \quad (6.0c)$$

dove

$q_c$  è la resistenza alla punta misurata

$Pa$  è la tensione di riferimento (1 atmosfera) nelle stesse unità di  $\sigma'_{vo}$

$f_s$  è l'attrito del manicotto

$n$  è un'esponente che dipende dal tipo di suolo, variabile tra 0,5 e 1.

Calcolato  $I_C$ , si procede con la correzione della resistenza alla punta misurata  $q_c$  mediante la seguente espressione:

$$q_{c1N} = C_Q \cdot \left( \frac{q_c}{Pa} \right) \quad (6.1)$$

$$C_Q = \left( \frac{Pa}{\sigma'_{vo}} \right)^n \leq 1,7 \quad (6.2)$$

dove  $n$  si determina per via iterativa dalla seguente relazione:

$$n = 1,338 - 0,249 \cdot q_{c1N}^{0,264} \quad (6.3)$$

La correzione della resistenza alla punta dovuta al contenuto di materiale fine viene valutata mediante la seguente procedura:

$$(q_{c1N})_{cs} = q_{c1N} + \Delta q_{c1N} \quad (6.4a)$$

$$\Delta q_{c1N} = \left( 11,9 + \frac{q_{c1N}}{14,6} \right) \cdot \exp \left[ 1,63 - \frac{9,7}{FC + 2} - \left( \frac{15,7}{FC + 2} \right)^2 \right] \quad (6.4b)$$

Dove la frazione di fine  $FC(\%)$  viene calcolata mediante l'espressione seguente:

$$FC(\%) = 2,8 \cdot (I_c)^{2,60} \quad (6.5)$$

La resistenza alla liquefazione per una magnitudo pari a 7,5 (**CRR**<sub>7,5</sub>) si calcola da:

$$CRR = \exp \left[ \frac{(q_{c1N})_{cs}}{113} + \left( \frac{(q_{c1N})_{cs}}{1000} \right)^2 - \left( \frac{(q_{c1N})_{cs}}{140} \right)^3 + \left( \frac{(q_{c1N})_{cs}}{137} \right)^4 - 2.80 \right] \quad (6.6)$$

Per  $z_w > z$ , con  $z_w$  profondità della falda, e per  $(q_{c1N})_{cs} \leq 160$  il terreno è non liquefacibile (NL).

Il rapporto di sforzo ciclico **CSR** (*Cyclic Stress Ratio*) si determina da:

$$CSR = 0,65 \cdot \left( \frac{a_{max}}{g} \right) \cdot \left( \frac{\sigma_{v0}}{\sigma'_{v0}} \right) \cdot r_d \quad (6.7)$$

Dove per il coefficiente di riduzione delle tensioni  $r_d$  si utilizza la formula, con  $M$  si indica la magnitudo:

$$r_d = \exp[\alpha(z) + \beta(z) \cdot M] \quad (6.8a)$$

$$\alpha = -1,1012 - 1,126 \cdot \operatorname{sen} \left[ \frac{z}{11,73} + 5,133 \right] \quad (6.8b)$$

$$\beta = 0,106 + 0,118 \cdot \operatorname{sen} \left[ \frac{z}{11,28} + 5,142 \right] \quad (6.8c)$$

Il fattore di sicurezza alla liquefazione è definito nel modo seguente:

$$FS = \frac{CRR_{7,5}}{CSR} \cdot MSF \cdot K_\sigma \quad (6.9)$$

Per determinare il fattore di scala della magnitudo **MSF**, la formula di **Idriss & Boulanger** utilizza l'espressione:

$$MSF = 1 + (MSF_{max} - 1) \cdot 8.64 \cdot \exp \left( -\frac{M}{4} \right) - 1.325 \leq 1,8 \quad (6.10)$$

$$MSF_{max} = 1.09 + \left( \frac{qc1ncs}{180} \right)^3 \leq 2.2$$

Il fattore di correzione della pressione di confinamento  $K_\sigma$  è dato da:

$$K_\sigma = 1 - C_\sigma \cdot \ln \left( \frac{\sigma'_{v0}}{p_a} \right) \leq 1 \quad (6.11a)$$

$$C_\sigma = \frac{1}{37,3 - 8,27 \cdot (q_{c1N})^{0,264}} \leq 0,3 \quad (6.11b)$$

## DATI GENERALI

## PROGETTO E LOCALIZZAZIONE

Titolo lavoro: PUA "Via Romana" - CPT3

Cliente: CBL srl

Indirizzo, Coordinate: Via Romana - Medolla (MO)

Data 17/07/2020

Normativa: Norme Tecniche Costruzioni, Circolare 2 febbraio 2009, n.617

Fattore sicurezza normativa 1

### FALDA

Profondità falda idrica 1.5 m

### CARICHI SUL PIANO CAMPAGNA

Base 1 m

Lunghezza 10 m

Carico in superficie 100 kPa

Metodo calcolo stato tensionale Bussinesq

Coefficiente di Poisson 0.25

### DATI SIMICI

Accelerazione Bedrock 0.15

Tipo Suolo: C-Sabbie, ghiaie mediamente addensate, argille di media consistenza Vs30=180-360

Morfologia: T1-Superficie pianeggiante, pendii e rilievi isolati con inclinazione media  $i \leq 15^\circ$

Coefficiente amplificazione stratigrafica (SS) 1.58

Coefficiente amplificazione topografica (ST) 1

Magnitudo momento sismico (Mw) 6.14

Peak ground acceleration (PGA) 0.237

### PARAMETRI GEOTECNICI

Strato Nr	Descrizi one	Quota iniziale (m)	Quota finale (m)	Peso unià volume (KN/mc )	Peso unità volume saturato (KN/mc )	Numero colpi medio (Nspt)	D50 granuli (mm)	Resiste nza qc (KPa)	Resiste nza attrito laterale fs (KPa)	Velocit à onde di taglio Vs (m/s)
1		0	0.2	18	0	0	0	500	71	0
2		0.2	0.4	18	0	0	0	1000	67	0
3		0.4	0.6	18	0	0	0	1000	67	0
4		0.6	0.8	18	0	0	0	1000	48	0
5		0.8	1	18	0	0	0	1100	46	0
6		1	1.2	18	0	0	0	2000	27	0
7		1.2	1.4	18	0	0	0	1900	33	0
8		1.4	1.6	18	0	0	0	1900	46	0
9		1.6	1.8	18	0	0	0	1100	69	0
10		1.8	2	18	0	0	0	2600	60	0
11		2	2.2	18	0	0	0	1500	79	0
12		2.2	2.4	18	0	0	0	1100	61	0
13		2.4	2.6	18	0	0	0	1000	53	0

14	2.6	2.8	18	0	0	0	700	47	0
15	2.8	3	18	0	0	0	400	33	0
16	3	3.2	18	0	0	0	800	40	0
17	3.2	3.4	18	0	0	0	600	33	0
18	3.4	3.6	18	0	0	0	1400	27	0
19	3.6	3.8	18	0	0	0	1000	83	0
20	3.8	4	18	0	0	0	1400	67	0
21	4	4.2	18	0	0	0	700	70	0
22	4.2	4.4	18	0	0	0	1700	47	0
23	4.4	4.6	18	0	0	0	3000	73	0
24	4.6	4.8	18	0	0	0	3200	20	0
25	4.8	5	18	0	0	0	1600	33	0
26	5	5.2	18	0	0	0	1500	54	0
27	5.2	5.4	18	0	0	0	1400	82	0
28	5.4	5.6	18	0	0	0	2800	27	0
29	5.6	5.8	18	0	0	0	1900	79	0
30	5.8	6	18	0	0	0	1100	73	0
31	6	6.2	18	0	0	0	800	47	0
32	6.2	6.4	18	0	0	0	1300	68	0
33	6.4	6.6	18	0	0	0	1200	75	0
34	6.6	6.8	18	0	0	0	900	53	0
35	6.8	7	18	0	0	0	1100	61	0
36	7	7.2	18	0	0	0	1000	67	0
37	7.2	7.4	18	0	0	0	1000	59	0
38	7.4	7.6	18	0	0	0	1500	136	0
39	7.6	7.8	18	0	0	0	1000	59	0
40	7.8	8	18	0	0	0	2500	60	0
41	8	8.2	18	0	0	0	1100	52	0
42	8.2	8.4	18	0	0	0	1300	68	0
43	8.4	8.6	18	0	0	0	1700	94	0
44	8.6	8.8	18	0	0	0	1600	100	0
45	8.8	9	18	0	0	0	1700	100	0
46	9	9.2	18	0	0	0	1500	115	0
47	9.2	9.4	18	0	0	0	1900	127	0
48	9.4	9.6	18	0	0	0	2100	131	0
49	9.6	9.8	18	0	0	0	2200	138	0
50	9.8	10	18	0	0	0	1900	112	0
51	10	10.2	18	0	0	0	1700	100	0
52	10.2	10.4	18	0	0	0	1900	112	0
53	10.4	10.6	18	0	0	0	1900	119	0
54	10.6	10.8	18	0	0	0	2200	122	0
55	10.8	11	18	0	0	0	2200	129	0
56	11	11.2	18	0	0	0	1100	79	0
57	11.2	11.4	18	0	0	0	1500	54	0
58	11.4	11.6	18	0	0	0	1300	54	0
59	11.6	11.8	18	0	0	0	900	53	0
60	11.8	12	18	0	0	0	1100	69	0
61	12	12.2	18	0	0	0	1100	61	0
62	12.2	12.4	18	0	0	0	1000	48	0
63	12.4	12.6	18	0	0	0	1000	48	0
64	12.6	12.8	18	0	0	0	1000	53	0

65	12.8	13	18	0	0	0	1000	67	0
66	13	13.2	18	0	0	0	1300	100	0
67	13.2	13.4	18	0	0	0	1900	112	0
68	13.4	13.6	18	0	0	0	2500	147	0
69	13.6	13.8	18	0	0	0	2200	105	0
70	13.8	14	18	0	0	0	1600	107	0
71	14	14.2	18	0	0	0	1200	80	0
72	14.2	14.4	18	0	0	0	2000	105	0
73	14.4	14.6	18	0	0	0	2000	105	0
74	14.6	14.8	18	0	0	0	2000	95	0
75	14.8	15	18	0	0	0	2600	124	0

Correzione per la magnitudo (MSF) 1.08

Nr.	Prof ondit à dal p.c. (m)	Press ione litost atica (KPa )	Press ione verti cale effett iva (KPa )	Resis tenza alla punta norm alizz ata Q	Attrit o later ale norm alizz ato F(%)	Indic e di porta ment Ic o	Corr e per la press ione litost atica effic ace CQ	Resis tenza alla punta corre tta qc1 (KPa )	Coef fizie ridutt ivo (rd)	Resis tenza alla lique fazio ne (CR R)	Sforz o di tagli norm alizz ato (CS R)	Coef ficie di sicur ezza Fs	Susc ettibi lità di lique fazio ne	Indi ce di lique fazio ne	Risc hio
1	1.70	44.2	42.2	10.8	6.53	2.96	1.97	0.00	1.02	0.00	0.00	--	TER	0.00	MO
		20	59	56	5	5	5423	0	5	0	0		REN		LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
2	1.90	46.6	42.7	25.6	2.35	2.41	1.76	77.4	1.02	0.13	0.17	0.76	TER	4.28	BAS
		70	47	60	0	9	2029	51	1	1	2	4	REN		SO_
													O_S		RES
													USC		
													ETTI		
													BIL		
													E_DI		
													_LIQ		
													UEF		
													AZI		
													ONE		

3	2.10	49.2	43.3	14.8	5.44	2.82	1.87	77.4	1.01	0.13	0.17	--	TER	4.28	MO
	48	64	04	5	7	2886	51	7	1	2			REN		LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
4	2.30	51.9	44.0	10.8	5.82	2.94	1.91	77.4	1.01	0.13	0.17	--	TER	4.28	MO
	40	95	56	0	3	6926	51	3	1	2			REN		LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
5	2.50	54.7	44.9	9.86	5.60	2.96	1.91	77.4	1.00	0.13	0.17	--	TER	4.28	MO
	33	26	9	7	6	1927	51	9	1	2			REN		LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
6	2.70	57.6	45.8	6.90	7.31	3.16	1.95	77.4	1.00	0.13	0.17	--	TER	4.28	MO
	14	46	8	6	2	055	51	5	1	2			REN		LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		

7	2.90	60.5	46.8	3.94	9.72	3.44	2.01	77.4	1.00	0.13	0.17	--	LE_ DI_ IQU EFA ZIO NE_ RES TER	4.28	MO LTO BAS SO_ RES
		70	40	8	2	2	3936	51	1	1	2		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES		
8	3.10	63.5	47.9	7.89	5.43	3.04	1.86	77.4	0.99	0.13	0.17	--	TER	4.28	MO LTO BAS SO_ RES
		91	00	5	2	8	3343	51	6	1	2		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES		
9	3.30	66.6	49.0	5.92	6.18	3.18	1.87	77.4	0.99	0.13	0.17	--	TER	4.28	MO LTO BAS SO_ RES
		69	17	2	8	9	7524	51	2	1	2		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES		
10	3.50	69.7	50.1	13.8	2.03	2.61	1.70	77.4	0.98	0.13	0.17	--	TER	4.28	MO LTO
		96	82	17	0	2	997	51	7	1	2		REN		

															O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES
11	3.70	72.9	51.3	9.86	8.95	3.14	1.73	77.4	0.98	0.13	0.17	--	TER	4.28	MO LTO BAS SO_ RES		
		65	91	9	3	2	323	51	3	1	2		REN				
													O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES		
12	3.90	76.1	52.6	13.8	5.06	2.87	1.65	77.4	0.97	0.13	0.17	--	TER	4.28	MO LTO BAS SO_ RES		
		72	36	17	1	4	4766	51	8	1	2		REN				
													O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES		
13	4.10	79.4	53.9	6.90	11.2	3.34	1.71	77.4	0.97	0.13	0.17	--	TER	4.28	MO LTO BAS SO_ RES		
		12	15	8	80	0	9782	51	4	1	2		REN				
													O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA		BAS SO_ RES		

14	4.30	82.680	55.222	16.778	2.906	2.668	1.573493	77.451	0.969	0.131	0.172	--	ZIONE NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S TER REN O_N ON_ SUS CET TIBI LE_	4.28	MO LTO BAS SO_ RES
15	4.50	85.974	56.555	29.608	2.505	2.453	1.4718	77.089	0.964	0.128	0.226	0.568	ZIONE NE_ RES TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S	17.25	MO LTO ALT O_R ES
16	4.70	89.291	57.910	31.582	0.643	2.094	1.442633	70.929	0.959	0.121	0.228	0.532	ZIONE NE_ RES TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S	19.40	MO LTO ALT O_R ES
17	4.90	92.628	59.285	15.791	2.189	2.632	1.504988	70.929	0.954	0.121	0.228	--	ZIONE NE_ RES TER REN O_N ON_ SUS CET TIBI LE_	19.40	MO LTO BAS SO_ RES

18	5.10	95.9	60.6	14.8	3.84	2.81	1.48	70.9	0.94	0.12	0.22	--	DI_L IQU EFA ZIO NE_ RES TER 19.4 REN 0 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 19.4 REN 0 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
		83	79	04	6	2	7392	29	9	1	8			
19	5.30	99.3	62.0	13.8	6.30	2.98	1.46	70.9	0.94	0.12	0.22	--	DI_L IQU EFA ZIO NE_ RES TER 19.4 REN 0 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 19.4 REN 0 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
		54	89	17	5	2	9839	29	4	1	8			
20	5.50	102.	63.5	27.6	1.00	2.26	1.37	70.5	0.93	0.12	0.23	0.51	DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO ALT O_R ES
		739	13	34	1	3	8249	48	9	0	4	2		
21	5.70	106.	64.9	18.7	4.40	2.79	1.39	70.5	0.93	0.12	0.23	--	DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
		138	50	52	4	1	4928	48	4	0	4			

														SUS	RES
														CET	
														TIBI	
														LE_	
														DI_L	
														IQU	
														EFA	
														ZIO	
														NE_	
														RES	
22	5.90	109.	66.4	10.8	7.37	3.12	1.41	70.5	0.92	0.12	0.23	--	TER	23.1	MO
		549	00	56	0	7	739	48	9	0	4		REN	5	LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
23	6.10	112.	67.8	7.89	6.84	3.22	1.41	70.5	0.92	0.12	0.23	--	TER	23.1	MO
		971	60	5	1	7	5574	48	4	0	4		REN	5	LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
24	6.30	116.	69.3	12.8	5.74	3.01	1.35	70.5	0.91	0.12	0.23	--	TER	23.1	MO
		402	30	30	5	1	8957	48	9	0	4		REN	5	LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		

25	6.50	119.843	70.810	11.843	6.943	3.100	1.341926	70.548	0.913	0.120	0.234	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	23.15	MO LTO BAS SO_ RES
26	6.70	123.292	72.298	8.882	6.824	3.204	1.336579	70.548	0.908	0.120	0.234	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	23.15	MO LTO BAS SO_ RES
27	6.90	126.749	73.793	10.856	6.268	3.114	1.303784	70.548	0.903	0.120	0.234	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	23.15	MO LTO BAS SO_ RES
28	7.10	130.213	75.296	9.869	7.703	3.213	1.287273	70.548	0.897	0.120	0.234	--	RES TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	23.15	MO LTO BAS SO_ RES

														DI_L		
														IQU		
														EFA		
														ZIO		
														NE_		
														RES		
29	7.30	133.	76.8	9.86	6.81	3.18	1.26	70.5	0.89	0.12	0.23	--	TER	23.1	MO	
		683	05	9	0	5	6497	48	2	0	4		REN	5	LTO	
													O_N		BAS	
													ON_		SO_	
													SUS		RES	
													CET			
													TIBI			
													LE_			
													DI_L			
													IQU			
													EFA			
													ZIO			
													NE_			
													RES			
30	7.50	137.	78.3	14.8	9.97	3.16	1.22	70.5	0.88	0.12	0.23	--	TER	23.1	MO	
		160	20	04	9	1	9444	48	7	0	4		REN	5	LTO	
													O_N		BAS	
													ON_		SO_	
													SUS		RES	
													CET			
													TIBI			
													LE_			
													DI_L			
													IQU			
													EFA			
													ZIO			
													NE_			
													RES			
31	7.70	140.	79.8	9.86	6.86	3.20	1.22	70.5	0.88	0.12	0.23	--	TER	23.1	MO	
		642	41	9	6	1	6556	48	1	0	4		REN	5	LTO	
													O_N		BAS	
													ON_		SO_	
													SUS		RES	
													CET			
													TIBI			
													LE_			
													DI_L			
													IQU			
													EFA			
													ZIO			
													NE_			
													RES			
32	7.90	144.	81.3	24.6	2.54	2.60	1.17	70.5	0.87	0.12	0.23	--	TER	23.1	MO	
		130	67	73	7	4	4226	48	6	0	4		REN	5	LTO	
													O_N		BAS	

														ON_	SO_
														SUS_	RES_
														CET	
														TIBI	
														LE_	
														DI_	
														L	
														IQU	
														EFA	
														ZIO	
														NE_	
														RES	
33	8.10	147.	82.8	10.8	5.46	3.11	1.18	70.5	0.87	0.12	0.23	--	TER	23.1	MO
		622	98	56	0	5	5829	48	0	0	4		REN	5	LTO
													O_N		BAS
													ON_		SO_
													SUS_		RES
													CET		
													TIBI		
													LE_		
													DI_		
													L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
													TER	23.1	MO
													REN	5	LTO
													O_N		BAS
													ON_		SO_
													SUS_		RES
													CET		
													TIBI		
													LE_		
													DI_		
													L		
													IQU		
													EFA		
													ZIO		

36	8.70	158. 126	87.5 18	15.7 91	6.93 5	3.06 3	1.12 527	70.5 48	0.85 4	0.12 0	0.23 4	--	NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
37	8.90	161. 635	89.0 66	16.7 78	6.50 0	3.02 8	1.10 8575	70.5 48	0.84 8	0.12 0	0.23 4	--	NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
38	9.10	165. 148	90.6 17	14.8 04	8.61 5	3.16 0	1.09 5713	70.5 48	0.84 3	0.12 0	0.23 4	--	NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
39	9.30	168. 664	92.1 72	18.7 52	7.33 5	3.03 5	1.07 7394	70.5 48	0.83 7	0.12 0	0.23 4	--	NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES

40	9.50	172.183	93.730	20.725	6.795	2.983	1.06222	70.548	0.832	0.120	0.234	--	LE_ DI_ IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	23.15	MO LTO BAS SO_ RES
41	9.70	175.706	95.291	21.712	6.817	2.972	1.048395	70.548	0.826	0.120	0.234	--	LE_ DI_ IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	23.15	MO LTO BAS SO_ RES
42	9.90	179.231	96.855	18.752	6.509	3.014	1.036422	70.548	0.821	0.120	0.234	--	LE_ DI_ IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	23.15	MO LTO BAS SO_ RES
43	10.10	182.759	98.422	16.778	6.591	3.062	1.023838	70.548	0.815	0.120	0.234	--	LE_ DI_ IQU EFA ZIO NE_ RES TER REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	23.15	MO LTO

															O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	BAS SO_ RES
44	10.3 0	186. 290	99.9 91	18.7 52	6.53 6	3.02 4	1.01 0611	70.5 48	0.81 0	0.12 0	0.23 4	--	TER REN	23.1 5	MO LTO BAS SO_ RES	
															O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	BAS SO_ RES
45	10.5 0	189. 823	101. 563	18.7 52	6.95 8	3.04 7	0.99 8127 3	70.5 48	0.80 4	0.12 0	0.23 4	--	TER REN	23.1 5	MO LTO BAS SO_ RES	
															O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	BAS SO_ RES
46	10.7 0	193. 359	103. 137	21.7 12	6.08 0	2.96 1	0.98 6286 9	70.5 48	0.79 9	0.12 0	0.23 4	--	TER REN	23.1 5	MO LTO BAS SO_ RES	
															O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA	BAS SO_ RES

47	10.9	196.	104.	21.7	6.44	2.98	0.97	70.5	0.79	0.12	0.23	--	ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
	0	896	714	12	0	2	4645	48	3	0	4			
							6							
48	11.1	200.	106.	10.8	8.78	3.33	0.95	70.5	0.78	0.12	0.23	--	ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
	0	436	292	56	2	6	8949	48	8	0	4			
							9							
49	11.3	203.	107.	14.8	4.16	3.01	0.94	70.5	0.78	0.12	0.23	--	ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
	0	978	873	04	7	3	8890	48	2	0	4			
							8							
50	11.5	207.	109.	12.8	4.94	3.12	0.93	70.5	0.77	0.12	0.23	--	ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET	MO LTO BAS SO_ RES
	0	522	455	30	3	2	5916	48	7	0	4			
							7							

51	11.70	211.067	111.040	8.882	7.693	3.403	0.9205324	70.548	0.771	0.120	0.234	--	TIBILE_DIL IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBILE_DIL IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET	MO LTO BAS SO_ RES
52	11.90	214.615	112.626	10.856	7.793	3.326	0.9109439	70.548	0.766	0.120	0.234	--	TIBILE_DIL IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBILE_DIL IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET	MO LTO BAS SO_ RES
53	12.10	218.164	114.213	10.856	6.917	3.299	0.89096019	70.548	0.760	0.120	0.234	--	TIBILE_DIL IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET TIBILE_DIL IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET	MO LTO BAS SO_ RES
54	12.30	221.067	115.040	9.882	6.163	3.313	0.8805324	70.548	0.751	0.120	0.234	--	TIBILE_DIL IQU EFA ZIO NE_ RES TER 23.1 REN 5 O_N ON_ SUS CET	MO

	0	715	803	9	7	5	7154	48	5	0	4		REN	5	LTO
							9						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
55	12.5	225.	117.	9.86	6.19	3.32	0.87	70.5	0.74	0.12	0.23	--	TER	23.1	MO
	0	267	394	9	6	3	6184	48	9	0	4		REN	5	LTO
													O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
56	12.7	228.	118.	9.86	6.87	3.35	0.86	70.5	0.74	0.12	0.23	--	TER	23.1	MO
	0	821	986	9	3	6	5451	48	4	0	4		REN	5	LTO
							2						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
57	12.9	232.	120.	9.86	8.72	3.42	0.85	70.5	0.73	0.12	0.23	--	TER	23.1	MO
	0	376	580	9	8	6	4919	48	9	0	4		REN	5	LTO
							7						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		

58	13.1	235.	122.	12.8	9.39	3.34	0.84	70.5	0.73	0.12	0.23	--	EFA ZIO NE_ RES TER	23.1	MO
	0	933	176	30	8	0	9701	48	3	0	4		REN	5	LTO
							2						O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES
59	13.3	239.	123.	18.7	6.74	3.10	0.84	70.5	0.72	0.12	0.23	--	EFA ZIO NE_ RES TER	23.1	MO
	0	491	772	52	5	0	8445	48	8	0	4		REN	5	LTO
							5						O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES
60	13.5	243.	125.	24.6	6.51	2.99	0.84	70.5	0.72	0.12	0.23	--	EFA ZIO NE_ RES TER	23.1	MO
	0	050	370	73	3	2	6467	48	3	0	4		REN	5	LTO
							3						O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES		BAS SO_ RES
61	13.7	246.	126.	21.7	5.37	2.98	0.83	70.5	0.71	0.12	0.23	--	EFA ZIO NE_ RES TER	23.1	MO
	0	610	969	12	5	8	4247	48	8	0	4		REN	5	LTO
							3						O_N ON_ SUS		BAS SO_ RES

62	13.9	250.	128.	15.7	7.92	3.22	0.81	70.5	0.71	0.12	0.23	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER	23.1	MO
	0	172	569	91	7	7	6963	48	3	0	4		REN	5	LTO
							6						O_N ON_ SUS		BAS SO_ RES
63	14.1	253.	130.	11.8	8.45	3.36	0.80	70.5	0.70	0.12	0.23	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER	23.1	MO
	0	735	171	43	4	9	0719	48	7	0	4		REN	5	LTO
							9						O_N ON_ SUS		BAS SO_ RES
64	14.3	257.	131.	19.7	6.02	3.06	0.80	70.5	0.70	0.12	0.23	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER	23.1	MO
	0	298	773	38	5	9	5878	48	2	0	4		REN	5	LTO
							9						O_N ON_ SUS		BAS SO_ RES
													CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES		

65	14.5	260.	133.	19.7	6.03	3.07	0.79	70.5	0.69	0.12	0.23	--	TER	23.1	MO
	0	863	377	38	7	4	7612	48	7	0	4		REN	5	LTO
							1						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
66	14.7	264.	134.	19.7	5.47	3.05	0.78	70.5	0.69	0.12	0.23	--	TER	23.1	MO
	0	429	981	38	4	0	9497	48	2	0	4		REN	5	LTO
							6						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
67	14.9	267.	136.	25.6	5.31	2.94	0.79	70.5	0.68	0.12	0.23	--	TER	23.1	MO
	0	996	587	60	7	4	0567	48	7	0	4		REN	5	LTO
							3						O_N		BAS
													ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
68	15.1	0.00	0.00												
	0	0	0												

IPL (Iwasaki)=2.52 Zcrit=20 m Rischio=Basso

### Metodo di Robertson e Wride (1997)

Il 'metodo di Robertson e Wride' è basato sui risultati di prove CPT (*Cone Penetration Test*) ed utilizza l'indice di comportamento per il tipo di suolo  $I_C$  che viene calcolato mediante l'utilizzo della seguente formula:

$$I_c = \left[ (3,47 - \log_{10} Q)^2 + (\log_{10} R_f + 1,22)^2 \right]^{0,5} \quad (5.0a)$$

$$Q = \frac{q_c - \sigma_{vo}}{Pa} \left( \frac{Pa}{\sigma'_{vo}} \right)^n \quad (5.0b)$$

$$R_f = \frac{f_s}{q_c - \sigma_{vo}} 100 \quad (5.0c)$$

dove:

$q_c$  è la resistenza alla punta misurata

$Pa$  è la tensione di riferimento (1 atmosfera) nelle stesse unità di  $\sigma'_{vo}$

$f_s$  è l'attrito del manicotto

$n$  è un'esponente che dipende dal tipo di suolo.

Inizialmente si assume  $n = 1$ , come per un suolo argilloso e si procede al calcolo di  $I_C$  con la (5.0a).

Se  $I_C > 2,6$  il suolo è probabilmente di tipo argilloso e l'analisi si ferma. Il terreno non si considera a rischio di liquefazione.

Se  $I_C \leq 2,6$ , vuol dire che l'ipotesi assunta è errata, il suolo è di natura granulare,  $Q$  verrà ricalcolato utilizzando la (5.0a) usando come esponente  $n = 0,5$ .

Se è ancora  $I_C \leq 2,6$ , significa che l'ipotesi è giusta e il suolo è probabilmente non plastico e granulare.

Se invece  $I_C > 2,6$ , vuol dire che l'ipotesi è di nuovo errata e il suolo è probabilmente limoso.  $Q$  deve essere nuovamente ricalcolato dalla (2.8b) ponendo  $n = 0,75$ .

Calcolato  $I_C$ , si procede con la correzione della resistenza alla punta misurata  $q_c$  mediante la seguente espressione:

$$q_{c1N} = \frac{q_c}{Pa} \left( \frac{Pa}{\sigma'_{vo}} \right)^n \quad (5.1)$$

Dove l'esponente di sforzo  $n$  è lo stesso utilizzato nel calcolo di  $I_C$ .

La correzione alla resistenza alla punta dovuta al contenuto di materiale fine viene determinata dalla seguente procedura:

### Robertson e Wride classico

$$(q_{c1N})_{cs} = K_c q_{c1N} \quad (5.2a)$$

$$K_c = -0,403 I_c^4 + 5,581 I_c^3 - 21,63 I_c^2 + 33,75 I_c - 17,88 \quad (5.2b)$$

### Robertson e Wride modificato

$$(q_{c1N})_{cs} = q_{c1N} + \Delta q_{c1N} \quad (5.3a)$$

$$\Delta q_{c1N} = \frac{K_c}{1 - K_c} q_{c1N} \quad (5.3b)$$

dove  $K_c$  dipende dal contenuto di fine, FC (%):

$$\begin{aligned} K_c &= 0 && \text{per } FC \leq 5 \\ K_c &= 0,0267(FC - 5) && \text{per } 5 < FC \leq 35 \\ K_c &= 0,8 && \text{per } FC > 35 \end{aligned}$$

FC (%) viene calcolato mediante l'espressione seguente:

$$FC (\%) = 1,75 (I_c)^{3,25} - 3,7 \quad (5.4)$$

La resistenza alla liquefazione per una magnitudo pari a 7,5 (**CRR<sub>7,5</sub>**) si calcola con le espressioni seguenti:  
se  $(q_{c1N})_{cs} < 50$

$$CRR = 0,833 \left[ \frac{(q_{c1N})_{cs}}{1000} \right] + 0,05 \quad (5.5)$$

se  $50 \leq (q_{c1N})_{cs} < 160$

$$CRR = 93 \left[ \frac{(q_{c1N})_{cs}}{1000} \right]^3 + 0,08 \quad (5.6)$$

Il Rapporto di Tensione Ciclica per eventi sismici di magnitudo 7,5 (**CSR<sub>7,5</sub>**) si determina dalla seguente espressione:

$$\frac{\tau_{av}}{\sigma'_{vo}} = CSR_{7,5} = 0,65 \frac{a_g}{g} \frac{\sigma'_{vo}}{\sigma'_{vo}} r_d \quad (5.7)$$

Per magnitudo diverse occorre introdurre il fattore correttivo **MSF** (*Magnitude Scaling Factor*) come raccomandato dal **NCEER** (vedi Tabella 1)

$$CSR = \frac{CSR_{7,5}}{MSF} \quad (5.8)$$

**Tabella 1-** Fattore di scala della magnitudo derivato da diversi ricercatori

Magnitudo	Seed H.B. & Idriss I.M. (1982)	Ambraseys N.N (1988).	NCEER (Seed R. B. et alii) (1997; 2003)
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5,5	1,43	2,86	2,21
6,0	1,32	2,20	1,77
6,5	1,19	1,69	1,44
7,0	1,08	1,30	1,19
7,5	1,00	1,00	1,00
8,0	0,94	0,67	0,84
8,5	0,89	0,44	0,73

Per determinare il valore del coefficiente riduttivo  $r_d$  vengono utilizzate le formule raccomandate da un gruppo di esperti del **NCEER** (*National Center for Earthquake Engineering Research*):

per  $z < 9,15$  m

$$r_d = 1,0 - 0,00765 z \quad (5.9)$$

per  $9,15 \leq z < 23$  m

$$r_d = 1,174 - 0,00267 z \quad (5.10)$$

Il fattore di sicurezza alla liquefazione **FS** viene determinato dalla relazione:

$$FS = \frac{CRR}{CSR} \quad (5.11)$$

mentre l'indice e il rischio di liquefazione vengono calcolati con il metodo di **Iwasaki et alii** (1978; 1984).

## DATI GENERALI

### PROGETTO E LOCALIZZAZIONE

Titolo lavoro: PUA "Via Romana" - CPT3

Cliente: CBL srl

Indirizzo, Coordinate: Via Romana - Medolla (MO)

Data 17/07/2020

Normativa: Norme Tecniche Costruzioni, Circolare 2 febbraio 2009, n.617

Fattore sicurezza normativa	1
<b>FALDA</b>	
Profondità falda idrica	1.5 m
<b>CARICHI SUL PIANO CAMPAGNA</b>	
Base	1 m
Lunghezza	10 m
Carico in superficie	100 kPa
Metodo calcolo stato tensionale	Bussinesq
Coefficiente di Poisson	0.25
<b>DATI SIMICI</b>	
Accelerazione Bedrock	0.15

Tipo Suolo: C-Sabbie, ghiaie mediamente addensate, argille di media consistenza Vs30=180-360  
Morfologia: T1-Superficie pianeggiante, pendii e rilievi isolati con inclinazione media  $i \leq 15^\circ$

Coefficiente amplificazione stratigrafica (SS)	1.58
Coefficiente amplificazione topografica (ST)	1
Magnitudo momento sismico (Mw)	6.14
Peak ground acceleration (PGA)	0.237

#### PARAMETRI GEOTECNICI

Strato Nr	Descrizi one	Quota iniziale (m)	Quota finale (m)	Peso unità volume (KN/mc )	Peso unità volume saturo (KN/mc )	Numero colpi medio (Nspt)	D50 granuli (mm)	Resiste nza qc (KPa)	Resiste nza attrito laterale fs (KPa)	Velocit à onde di taglio Vs (m/s)
1		0	0.2	18	0	0	0	500	71	0
2		0.2	0.4	18	0	0	0	1000	67	0
3		0.4	0.6	18	0	0	0	1000	67	0
4		0.6	0.8	18	0	0	0	1000	48	0
5		0.8	1	18	0	0	0	1100	46	0
6		1	1.2	18	0	0	0	2000	27	0
7		1.2	1.4	18	0	0	0	1900	33	0
8		1.4	1.6	18	0	0	0	1900	46	0
9		1.6	1.8	18	0	0	0	1100	69	0
10		1.8	2	18	0	0	0	2600	60	0
11		2	2.2	18	0	0	0	1500	79	0
12		2.2	2.4	18	0	0	0	1100	61	0
13		2.4	2.6	18	0	0	0	1000	53	0
14		2.6	2.8	18	0	0	0	700	47	0
15		2.8	3	18	0	0	0	400	33	0
16		3	3.2	18	0	0	0	800	40	0
17		3.2	3.4	18	0	0	0	600	33	0
18		3.4	3.6	18	0	0	0	1400	27	0
19		3.6	3.8	18	0	0	0	1000	83	0
20		3.8	4	18	0	0	0	1400	67	0
21		4	4.2	18	0	0	0	700	70	0
22		4.2	4.4	18	0	0	0	1700	47	0
23		4.4	4.6	18	0	0	0	3000	73	0
24		4.6	4.8	18	0	0	0	3200	20	0
25		4.8	5	18	0	0	0	1600	33	0
26		5	5.2	18	0	0	0	1500	54	0
27		5.2	5.4	18	0	0	0	1400	82	0
28		5.4	5.6	18	0	0	0	2800	27	0
29		5.6	5.8	18	0	0	0	1900	79	0
30		5.8	6	18	0	0	0	1100	73	0
31		6	6.2	18	0	0	0	800	47	0
32		6.2	6.4	18	0	0	0	1300	68	0
33		6.4	6.6	18	0	0	0	1200	75	0
34		6.6	6.8	18	0	0	0	900	53	0
35		6.8	7	18	0	0	0	1100	61	0

36	7	7.2	18	0	0	0	1000	67	0
37	7.2	7.4	18	0	0	0	1000	59	0
38	7.4	7.6	18	0	0	0	1500	136	0
39	7.6	7.8	18	0	0	0	1000	59	0
40	7.8	8	18	0	0	0	2500	60	0
41	8	8.2	18	0	0	0	1100	52	0
42	8.2	8.4	18	0	0	0	1300	68	0
43	8.4	8.6	18	0	0	0	1700	94	0
44	8.6	8.8	18	0	0	0	1600	100	0
45	8.8	9	18	0	0	0	1700	100	0
46	9	9.2	18	0	0	0	1500	115	0
47	9.2	9.4	18	0	0	0	1900	127	0
48	9.4	9.6	18	0	0	0	2100	131	0
49	9.6	9.8	18	0	0	0	2200	138	0
50	9.8	10	18	0	0	0	1900	112	0
51	10	10.2	18	0	0	0	1700	100	0
52	10.2	10.4	18	0	0	0	1900	112	0
53	10.4	10.6	18	0	0	0	1900	119	0
54	10.6	10.8	18	0	0	0	2200	122	0
55	10.8	11	18	0	0	0	2200	129	0
56	11	11.2	18	0	0	0	1100	79	0
57	11.2	11.4	18	0	0	0	1500	54	0
58	11.4	11.6	18	0	0	0	1300	54	0
59	11.6	11.8	18	0	0	0	900	53	0
60	11.8	12	18	0	0	0	1100	69	0
61	12	12.2	18	0	0	0	1100	61	0
62	12.2	12.4	18	0	0	0	1000	48	0
63	12.4	12.6	18	0	0	0	1000	48	0
64	12.6	12.8	18	0	0	0	1000	53	0
65	12.8	13	18	0	0	0	1000	67	0
66	13	13.2	18	0	0	0	1300	100	0
67	13.2	13.4	18	0	0	0	1900	112	0
68	13.4	13.6	18	0	0	0	2500	147	0
69	13.6	13.8	18	0	0	0	2200	105	0
70	13.8	14	18	0	0	0	1600	107	0
71	14	14.2	18	0	0	0	1200	80	0
72	14.2	14.4	18	0	0	0	2000	105	0
73	14.4	14.6	18	0	0	0	2000	105	0
74	14.6	14.8	18	0	0	0	2000	95	0
75	14.8	15	18	0	0	0	2600	124	0

Correzione per la magnitudo (MSF) 1.67

Nr.	Prof ondit à dal p.c. (m)	Press ione litost atica total (KPa)	Press ione verti cale effett iva (KPa)	Resis tenza alla punta norm alizz ato	Attrit o later ale norm alizz ato	Indic e di porta ment o Ic	Corr ezion e per la press ione litost	Resis tenza alla punta corre tta	Coef fizie ridutt ivo (rd)	Resis tenza alla tagli o di norm alizz (CR	Sforz o di ficie di sicur ezza Fs	Susc ettibi tà di lique ne fazio ne	Indi ce di lique fazio ne	Risc hio
-----	---------------------------------------	--	--	---	---	--	---	---	--	---	---	---	---------------------------------------	-------------

	)	)	ata Q F(%)			atica	qc1		R)	(CS					
						effic	(KPa			R)					
						ace	)								
						CQ									
1	1.70	44.2	42.2	24.9	6.53	Ic1=	0.73	0.00	0.00	0.00	0.00	--	TER	--	
		20	59	84	5	2.90	2134	0	0	0	0		REN		
						Ic=2.	2						O_N		
						90							ON_		
													SUS		
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
2	1.90	46.6	42.7	39.7	2.35	Ic1=	1.52	108.	0.98	0.19	0.09	2.00	TER	--	MO
		70	47	67	0	2.32	949	602	5	9	9	4	REN		LTO
						Ic=2.							O_N		BAS
						46							ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
3	2.10	49.2	43.3	33.4	5.44	Ic1=	1.52	0.00	0.00	0.19	0.09	--	TER	--	MO
		48	64	56	5	2.76	949	0	0	9	9		REN		LTO
						Ic=2.							O_N		BAS
						76							ON_		SO_
													SUS		RES
													CET		
													TIBI		
													LE_		
													DI_L		
													IQU		
													EFA		
													ZIO		
													NE_		
													RES		
4	2.30	51.9	44.0	23.7	5.82	Ic1=	1.52	0.00	0.00	0.19	0.09	--	TER	--	MO
		40	95	68	0	2.89	949	0	0	9	9		REN		LTO
						Ic=2.							O_N		BAS
						89							ON_		SO_
													SUS		RES

5	2.50	54.7	44.9	21.0	5.60	Ic1=	1.52	0.00	0.00	0.19	0.09	--	CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
		33	26	40	7	2.91	949	0	0	9	9		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	
						Ic=2.								
						91								
6	2.70	57.6	45.8	14.0	7.31	Ic1=	1.52	0.00	0.00	0.19	0.09	--	TER --	MO LTO BAS SO_ RES
		14	46	12	6	3.12	949	0	0	9	9		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	
						Ic=3.								
						12								
7	2.90	60.5	46.8	7.24	9.72	Ic1=	1.52	0.00	0.00	0.19	0.09	--	TER --	MO LTO BAS SO_ RES
		70	40	7	2	3.42	949	0	0	9	9		REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	
						Ic=3.								
						42								

8	3.10	63.5	47.9	15.3	5.43	Ic1= 1.52 Ic=3.01 01	0.00	0.00	0.19	0.09	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
9	3.30	66.6	49.0	10.8	6.18	Ic1= 1.52 Ic=3.16 16	0.00	0.00	0.19	0.09	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
10	3.50	69.7	50.1	23.4	2.03	Ic1= 1.67 Ic=4.255 18	117.	0.97	0.23	0.12	1.84	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
11	3.70	72.9	51.3	18.0	8.95	Ic1= 1.67 Ic=3.10 10	0.00	0.00	0.23	0.12	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L	--	MO LTO BAS SO_ RES



														SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES		RES
16	4.70	89.2	57.9	42.0	0.64	Ic1=	1.31	60.0	0.96	0.10	0.13	0.72	TER	11.2	ALT	
		91	10	51	3	2.02	4086	17	4	0	7	9	REN	3	O_R ES	
						Ic=2.							O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S			
						11										
17	4.90	92.6	59.2	23.6	2.18	Ic1=	1.48	118.	0.96	0.23	0.13	1.68	TER	--	MO	
		28	85	82	9	2.59	0096	408	3	4	9	8	REN		LTO	
						Ic=4.							O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES		BAS SO_ RES	
						22										
18	5.10	95.9	60.6	23.1	3.84	Ic1=	1.48	0.00	0.00	0.23	0.13	--	TER	--	MO	
		83	79	39	6	2.77	0096	0	0	4	9		REN		LTO	
						Ic=2.							O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES		BAS SO_ RES	
						77										

19	5.30	99.3 54	62.0 89	20.9 48	6.30 5	Ic1= 2.95 Ic=2. 95	1.48 0096	0.00 0	0.00 0	0.23 4	0.13 9	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
20	5.50	102. 739	63.5 13	35.1 34	1.00 1	Ic1= 2.21 Ic=2. 28	1.25 4785	63.5 25	0.95 8	0.10 4	0.14 3	0.72 6	TER REN O_S USC ETTI BIL E_DI _LIQ UEF AZI ONE _RE S	13.0 1	ALT O_R ES
21	5.70	106. 138	64.9 50	27.6 19	4.40 4	Ic1= 2.75 Ic=2. 75	1.25 4785	0.00 0	0.00 0	0.10 4	0.14 3	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	ALT O_R ES
22	5.90	109. 549	66.4 00	14.9 16	7.37 0	Ic1= 3.10 Ic=3. 10	1.25 4785	0.00 0	0.00 0	0.10 4	0.14 3	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU	--	ALT O_R ES

23	6.10	112.971	67.860	10.124	6.841	Ic1= 3.21 Ic=3. 21	1.254785	0.000	0.000	0.104	0.143	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	ALT O_R ES
24	6.30	116.402	69.330	17.072	5.745	Ic1= 2.99 Ic=2. 99	1.254785	0.000	0.000	0.104	0.143	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	ALT O_R ES
25	6.50	119.843	70.810	15.254	6.943	Ic1= 3.08 Ic=3. 08	1.254785	0.000	0.000	0.104	0.143	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	ALT O_R ES
26	6.70	123.292	72.298	10.743	6.824	Ic1= 3.19 Ic=3. 19	1.254785	0.000	0.000	0.104	0.143	--	EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	ALT O_R ES

27	6.90	126.749	73.793	13.189	6.268	Ic1= 3.10 Ic=3.10	1.25	0.00	0.00	0.10	0.14	--	CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	ALT O_R ES
28	7.10	130.213	75.296	11.552	7.703	Ic1= 3.20 Ic=3.20	1.25	0.00	0.00	0.10	0.14	--	CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	ALT O_R ES
29	7.30	133.683	76.805	11.279	6.810	Ic1= 3.17 Ic=3.17	1.25	0.00	0.00	0.10	0.14	--	CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	ALT O_R ES

30	7.50	137.160	78.320	17.401	9.979	Ic1= 3.15 Ic=3.15	1.254785	0.000	0.000	0.104	0.143	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	ALT O_R ES
31	7.70	140.642	79.841	10.763	6.866	Ic1= 3.19 Ic=3.19	1.254785	0.000	0.000	0.104	0.143	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	ALT O_R ES
32	7.90	144.130	81.367	27.715	2.547	Ic1= 2.58 Ic=2.60	1.108603	138.575	0.940	0.327	0.154	2.131	TER REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	--	MO LTO BAS SO_ RES
33	8.10	147.622	82.898	11.489	5.460	Ic1= 3.10 Ic=3.10	1.108603	0.000	0.000	0.327	0.154	--	TER REN O_N ON_ SUS CET TIBI LE_ DI_L	--	MO LTO BAS SO_ RES



															SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES	RES
38	9.10	165. 148	90.6 17	14.7 31	8.61 5	Ic1= 3.15 Ic=3. 15	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER --	MO LTO BAS SO_ RES		
39	9.30	168. 664	92.1 72	18.7 84	7.33 5	Ic1= 3.03 Ic=3. 03	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER --	MO LTO BAS SO_ RES		
40	9.50	172. 183	93.7 30	20.5 68	6.79 5	Ic1= 2.98 Ic=2. 98	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER --	MO LTO BAS SO_ RES		
														SUS CET TIBI LE_ DI_ L IQU EFA ZIO NE_ RES		

41	9.70	175.706	95.291	21.243	6.817	Ic1= 2.97 Ic=2.97	1.108603	0.000	0.000	0.327	0.154	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
42	9.90	179.231	96.855	17.766	6.509	Ic1= 3.01 Ic=3.01	1.108603	0.000	0.000	0.327	0.154	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
43	10.10	182.759	98.422	15.416	6.591	Ic1= 3.06 Ic=3.06	1.108603	0.000	0.000	0.327	0.154	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
44	10.30	186.290	99.991	17.139	6.536	Ic1= 3.02 Ic=3.02	1.108603	0.000	0.000	0.327	0.154	--	RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES

45	10.5	189.	101.	16.8	6.95	Ic1=	1.10	0.00	0.00	0.32	0.15	--	DI_L IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
	0	823	563	39	8	3.05	8603	0	0	7	4		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
						Ic=3.								
						05								
46	10.7	193.	103.	19.4	6.08	Ic1=	1.10	0.00	0.00	0.32	0.15	--	DI_L IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
	0	359	137	56	0	2.96	8603	0	0	7	4		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
						Ic=2.								
						96								
47	10.9	196.	104.	19.1	6.44	Ic1=	1.10	0.00	0.00	0.32	0.15	--	DI_L IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
	0	896	714	29	0	2.98	8603	0	0	7	4		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
						Ic=2.								
						98								
48	11.1	200.	106.	8.46	8.78	Ic1=	1.10	0.00	0.00	0.32	0.15	--	DI_L IQU EFA ZIO NE_ RES TER --	MO LTO BAS
	0	436	292	3	2	3.34	8603	0	0	7	4		REN O_N	
						Ic=3.								

																ON_	SO_
															SUS	RES	
															CET		
															TIBI		
															LE_		
															DI_L		
															IQU		
															EFA		
															ZIO		
															NE_		
															RES		
49	11.3	203.	107.	12.0	4.16	Ic1=	1.10	0.00	0.00	0.32	0.15	--		TER	--	MO	
	0	978	873	14	7	3.02	8603	0	0	7	4			REN		LTO	
						Ic=3.								O_N		BAS	
						02								ON_		SO_	
														SUS		RES	
														CET			
														TIBI			
														LE_			
														DI_L			
														IQU			
														EFA			
														ZIO			
														NE_			
														RES			
50	11.5	207.	109.	9.98	4.94	Ic1=	1.10	0.00	0.00	0.32	0.15	--		TER	--	MO	
	0	522	455	1	3	3.13	8603	0	0	7	4			REN		LTO	
						Ic=3.								O_N		BAS	
						13								ON_		SO_	
														SUS		RES	
														CET			
														TIBI			
														LE_			
														DI_L			
														IQU			
														EFA			
														ZIO			
														NE_			
														RES			
51	11.7	211.	111.	6.20	7.69	Ic1=	1.10	0.00	0.00	0.32	0.15	--		TER	--	MO	
	0	067	040	4	3	3.41	8603	0	0	7	4			REN		LTO	
						Ic=3.								O_N		BAS	
						41								ON_		SO_	
														SUS		RES	
														CET			
														TIBI			
														LE_			
														DI_L			
														IQU			
														EFA			
														ZIO			

52	11.9 0	214. 615	112. 626	7.86 1	7.79 3	Ic1= 3.33 Ic=3. 33	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
53	12.1 0	218. 164	114. 213	7.72 1	6.91 7	Ic1= 3.30 Ic=3. 30	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
54	12.3 0	221. 715	115. 803	6.72 1	6.16 7	Ic1= 3.32 Ic=3. 32	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
55	12.5 0	225. 267	117. 394	6.59 9	6.19 6	Ic1= 3.33 Ic=3. 33	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES

56	12.7 0	228. 821	118. 986	6.48 1	6.87 3	Ic1= 3.36 Ic=3. 36	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	LE_ DI_ IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
57	12.9 0	232. 376	120. 580	6.36 6	8.72 8	Ic1= 3.43 Ic=3. 43	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
58	13.1 0	235. 933	122. 176	8.70 9	9.39 8	Ic1= 3.35 Ic=3. 35	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER -- REN O_N ON_ SUS CET TIBI LE_ DI_ IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
59	13.3 0	239. 491	123. 772	13.4 16	6.74 5	Ic1= 3.11	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER -- REN	MO LTO

						Ic=3. 11									O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	BAS SO_ RES
60	13.5 0	243. 050	125. 370	18.0 02	6.51 3	Ic1= 3.01 Ic=3. 01	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER -- REN	MO LTO		
													O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	BAS SO_ RES		
61	13.7 0	246. 610	126. 969	15.3 85	5.37 5	Ic1= 3.00 Ic=3. 00	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER -- REN	MO LTO		
													O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	BAS SO_ RES		
62	13.9 0	250. 172	128. 569	10.4 99	7.92 7	Ic1= 3.24 Ic=3. 24	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	TER -- REN	MO LTO		
													O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA	BAS SO_ RES		

63	14.1 0	253. 735	130. 171	7.26 9	8.45 4	Ic1= 3.38 Ic=3. 38	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
64	14.3 0	257. 298	131. 773	13.2 25	6.02 5	Ic1= 3.08 Ic=3. 08	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
65	14.5 0	260. 863	133. 377	13.0 39	6.03 7	Ic1= 3.09 Ic=3. 09	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	MO LTO BAS SO_ RES
66	14.7 0	264. 429	134. 981	12.8 58	5.47 4	Ic1= 3.07 Ic=3. 07	1.10 8603	0.00 0	0.00 0	0.32 7	0.15 4	--	ZIO NE_ RES TER -- REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER -- REN O_N ON_ SUS CET	MO LTO BAS SO_ RES

67	14.9	267.	136.	17.0	5.31	Ic1=	1.10	0.00	0.00	0.32	0.15	--	TIBI LE_ DI_L IQU EFA ZIO NE_ RES TER --	MO LTO BAS SO_ RES
	0	996	587	73	7	2.97	8603	0	0	7	4		REN O_N ON_ SUS CET TIBI LE_ DI_L IQU EFA ZIO NE_ RES	
						Ic=2. 97							Terre --	Molt o bass o
68	15.1	0.00	0.00										no non susce ttibil e di lique fazio ne	

IPL (Iwasaki)=0.81 Zcrit=20 m Rischio=Basso